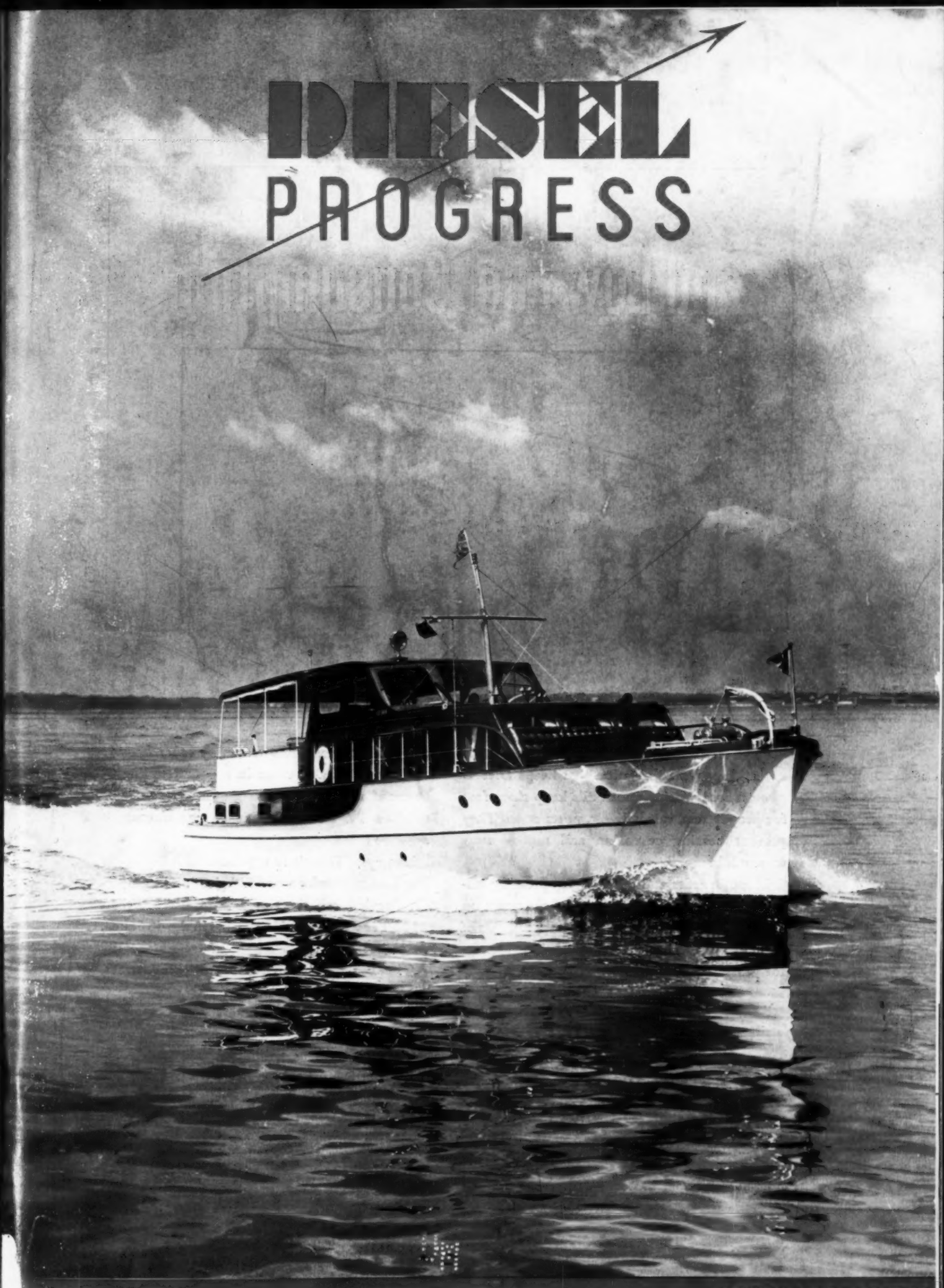
DIESEL PROGRESS



IVE DOLLARS PER YEAR JANUARY, 1947 FIFTY CENTS PER COPY

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DIESEL and GAS ENGINE PROGRESS

IN INDUSTRY — IN TRANSPORTATION • ON THE SEA • IN THE AIR

FRONT COVER ILLUSTRATION: "Blue Swan," a modern 60 ft. yacht, designed and built by Consolidated Shipbuilding Corporation and powered with a pair of General Motors Diesels.

DIESEL PROGRESS for January, 1947, Vol. XIII, No. 1. Published monthly by Diesel Engines, Inc., 2 West 45th Street, New York 19, N. Y. Tel. MUrray-Hill 2-7333. Subscription rates are $5.00 for U.S.A. and possessions. All other countries $7.50 per year. Subscriptions may be paid the London office at £1-17s per year.

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JANUARY 1947

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Diesel cruiser, "Tonya III" built by Elco and powered by General Motors Diesels swiftly cuts through the calm waters of Newark Bay on a trial run.

ELCO 62-FOOTER HAS DIESEL DRIVE

TONYA III is the first postwar Elco 62 foot Diesel yacht. She was recently delivered to Mr. Burkett Miller of Chattanooga, Tenn. in time for the Florida season. *Tonya III* is powered with two 200 hp. General Motors Diesels giving speeds of 15-17 mph. She provides luxurious accommodations for seven in the owner's party and a crew of two or three. Maximum advantage has been taken of the cabin and deck space to provide accommodations ordinarily found in only a much larger vessel.

Built with an oak keel and frames and mahogany planking, the yacht is solidly constructed. Watertight bulkheads are located at the bow, engine room and stern. The decks are white pine. The deckhouse is mahogany. All hardware and deck fittings are chromium plated brass or bronze.

The engine installation consists of two General Motors Diesel engines developing 200 hp. apiece at 2000 rpm. They are six-cylinder models with a bore of 4¼" and a stroke of 5". Each engine is equipped with a combined reverse and 2:1 reduction gear, built-in fresh water cooling system with salt and fresh water pumps and thermostat, governor, oil cooler and oil filter. Watercooled mufflers are installed. The electrical system is supplied by storage batteries and generators mounted on the engines. This supply is sufficient for all the electrical auxiliaries aboard which include lights, blowers, fans and pumps. A fire alarm system is also supplied by this system.

The engine base for the Diesel installation is interesting to note. It is an Elco-designed foundation of the shock absorbing, suspension type, constructed of steel girders hung in rubber mountings. The engine compartment is sealed with rubber and is insulated against transmission of sound by means of fireproof acoustical material between beams and covered with perforated metal. The overheads of the deckhouse and owner's quarters are heat and sound insulated.

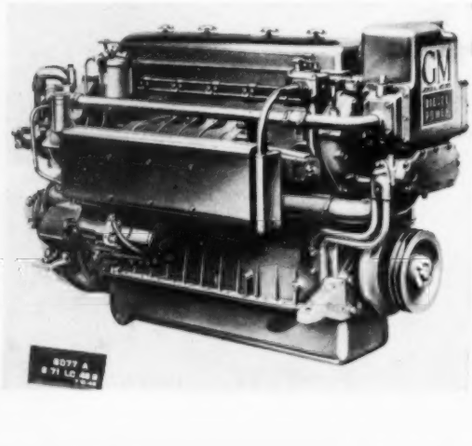
The fuel system is designed to eliminate fire hazard. Cylindrical tanks of the best construction obtainable are installed. Outboard vents are installed and filling vents have an overflow feature which vents surplus fuel overboard rather than causing the overflow to reach the deck and cause fire danger. The tanks are of 500 gallon capacity and are fitted with handhole plates for easy cleaning.

The water tanks aboard the yacht have a capacity of 300 gallons and are constructed of tin-lined copper. All piping is brass and copper. An automatic pressure system for hot and cold water is installed.

Luxurious lounge of the "Tonya III," owned by Mr. Burkett Miller of Chattanooga, Tenn.

The "Makaira," a new 65-foot twin-screw Diesel cruiser, owned by C. F. Johnson of Palm Beach. She was designed by F. C. Geiger and built by John Trumpy and Sons. She is powered by two 6-cylinder General Motors Diesels of 165 hp. each and has a top speed of 18 mph.

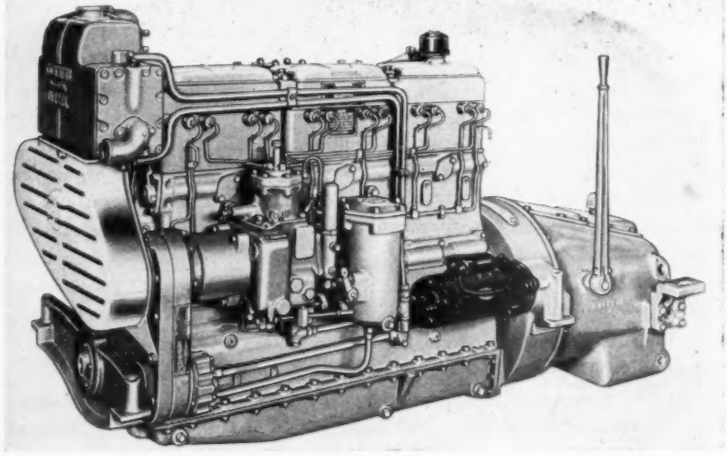
Illustration shows General Motors Diesel typical of ones installed in "Makaira."

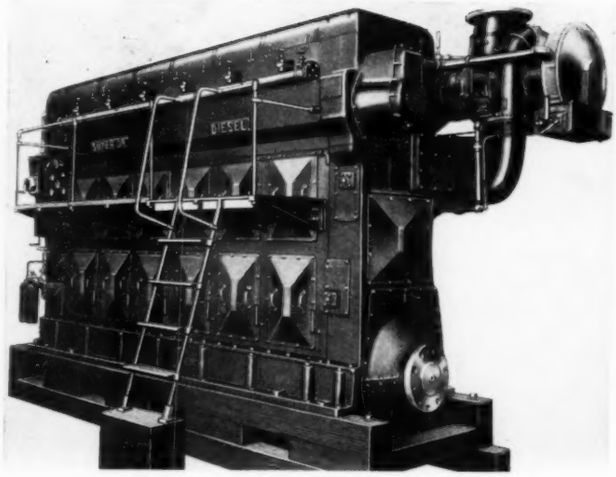


MOTOR BOAT SHOW

At the Motor Show to be held at the Grand Central Palace, New York, January 10th-18th, the Diesel engine manufacturers will present their newest marine models to the marine-conscious public. On these and the following pages several of these marine Diesel installations are pictured. It has been a long time since the last show and meantime much has happened in the marine Diesel field. A wide variety of marine installations have been pictured in order to give a cross-section. The emphasis has not been restricted to yachts for the reason that the work boat field—trawlers, tugs, dredges and the like, represent a large portion of marine Diesel installations found on our waterways today.

The "Spawn," one of a series of 45 ft. trollers built by the Tacoma Boat Building Co., is powered by a Cummins Diesel as shown in picture below. For this service, the engine is rated at 110 hp. and drives the boat at a speed of 9½ knots. The Cummins Engine Co. builds five marine models. Largest—275 hp.—is supercharged with a weight of 16 lbs. per horsepower.





"Kitty Hawk's" 990 hp. Superior Diesel.

All Steel Diesel Tuna Clipper "Kitty Hawk."

BACK AGAIN

STREAMLINED CLIPPER

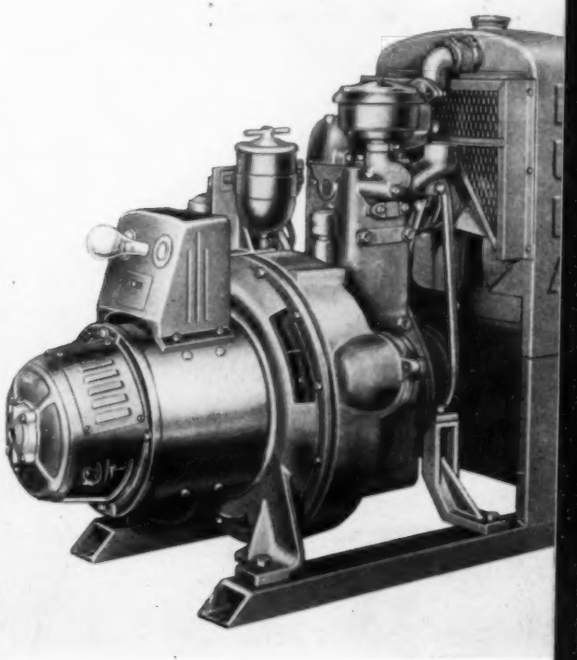
All-steel all welded Tuna Clipper *Kitty Hawk* is now operating with record catches on the west coast. She is supplied propulsion power by a Superior Diesel. Heavy power loads are the rule for these vessels which must be able to supply refrigeration for the catch.

Illustration shows the Superior Diesel used to supply main propulsion power for the *Kitty Hawk*. This Diesel, 6-cylinder, supercharged, 14½ x 20", develops 990 hp. at its maximum speed of 360 rpm., making sure that the *Kitty Hawk* gets her payload back to the mainland in record time.

ALASKAN TRAWLER

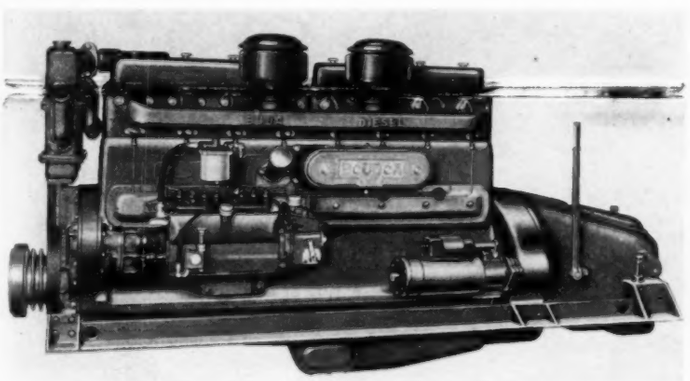
The Buda Company has announced several new marine Diesel models. One 6-cylinder engine is rated at 104 hp. for tug and trawler duty while the other, an 8 cylinder Diesel, is rated at 140 hp. at 1200 rpm. for similar duty. Both engines are available in supercharged models. A closed keel cooling system is offered as standard equipment for both models. A choice of reduction gears is offered for both engines.

The *Symphony* has plenty of power for the job she has to do. Her Buda is rated at 171 hp. at 900 rpm. for a speed of 10 knots.

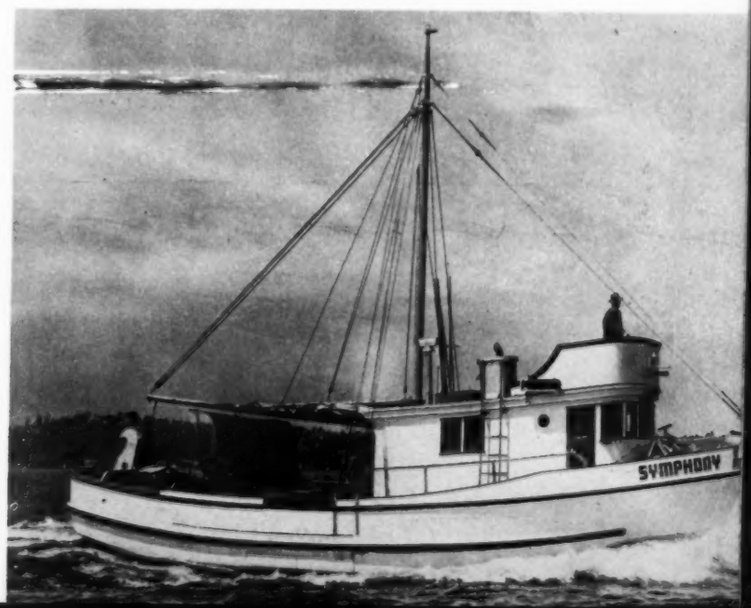


Buda's 1-cylinder 3 kw. generating set for marine installation.

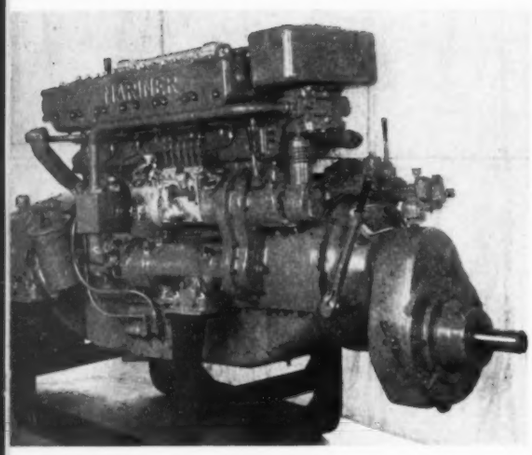
Buda's new marine Diesel 8-cylinder with a bore of 5¼" and a stroke of 6½" which is rated from 140-200 hp. for various classes of service.



The "Symphony," an Alaskan Trawler, is powered by a 6-cylinder Buda Diesel which develops 171 hp. at 900 r/m. for a vessel speed of 10 knots.



The "Edith," a 45-ft. party fishing boat, is powered by a 125 hp. Mack Diesel.



The 125 hp. Mack Mariner installed aboard the "Edith."

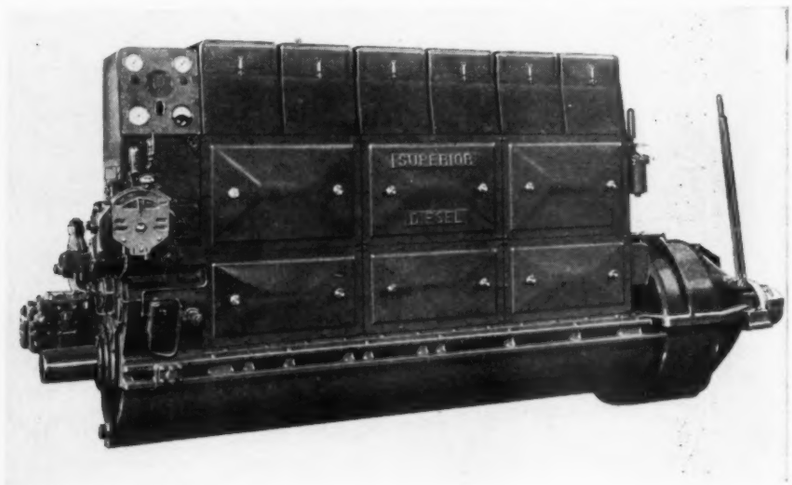
FOR PARTY FISHING

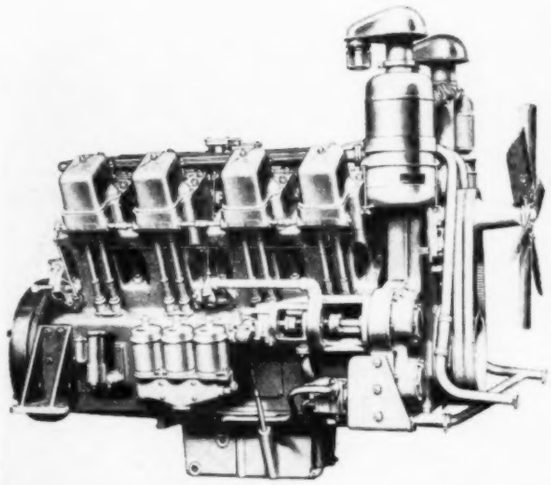
The Johnson Boatworks of Brooklyn, N. Y., specialize in boats designed for party fishing. Their latest, the 45-ft. *Edith* is powered by a Mack Mariner Diesel developing 125 hp. at 1800 rpm. for intermittent service. The boat will sleep two in the forward cabin. There is ample deck space for a large party of fishing enthusiasts. Complete pilot house control of the engine makes one man operation practical. When the bluefish and the weakfish run in early fall these party boats are in great demand by the weekend fishermen of the east coast from Maine to Maryland.

NEW ENGLAND TRAWLER

A representative boat of the hundreds of Atlantic coast fishing vessels is the *Ethel C,* a Diesel-engined trawler, operating with a 300 hp. Superior Diesel. It has a 9" x 12" bore and stroke and delivers its rated power at 600 rpm. The *Ethel C* represents one of an increasing number of fishing boats which depend on Diesels for the heavy duty work of trawling and for the equally important job of getting the catch back to the market in a hurry when prices are good. These are the boats that are spelling the doom of the outmoded sail and steam craft.

(Left) The New England Trawler "Ethel C," one of the sturdy fishing boats that dot the fishing banks when the cod run. Below is seen the Superior Diesel model which is installed aboard her. It is a 300 hp. Diesel, 9 in. x 12 in., with a rated rpm. of 600.





135 hp. "V"-Type Caterpillar Diesel supplies propulsion power for "Athelta."

Canadian River Dredge "Athelta" keeps 200 miles of river clear of sandbars.

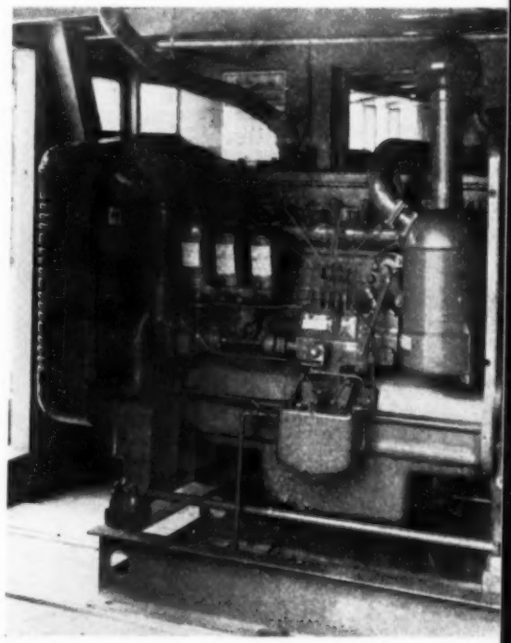
CANADIAN RIVER DREDGE

Designed and prefabricated by the Standard Iron Works of Edmonton, Alberta, and assembled at Hudson Bay, the *Athelta*, a sternwheeler dredge, is proving effective in keeping open the vital thoroughfare of the Athabaska River of Alberta. Caterpillar Diesels are installed aboard the *Athelta* both for propulsion and dredging power. Dredging is accomplished by directing the slipstream of the two dredging propellers towards the sandbar to be removed, the river does the rest.

Sternwheeler Dredge *Athelta* keeps a 200 mile stretch of the Athabaska River clear of snags and sandbars. She is equipped with four Caterpillar Diesels. Steel spuds amidships are lowered to hold vessel on sandbar while working. Propulsion power is supplied by a Caterpillar 135 bhp. Diesel through a 1:1 Twin Disc Marine gear connected to a right angle reduction gear driving the staggered stern wheel.

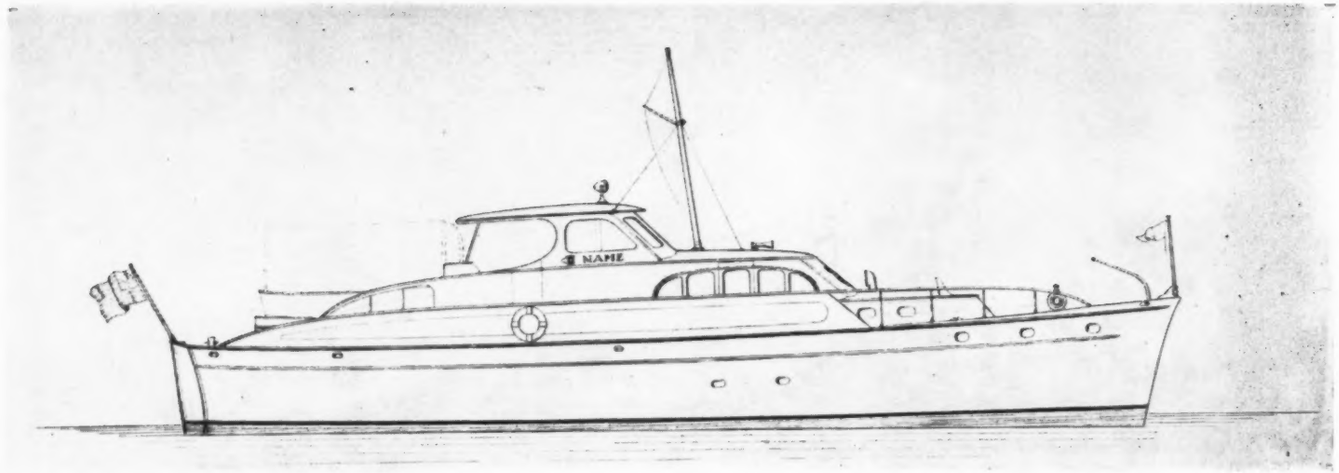
TOWBOAT "JOE S"

Builder, owner and operator of one of smallest towboats on the river is Pearl Snider of Parkersburg, West Virginia. Snider with his 57-foot stern-wheeled towboat can handle 3 150-foot barges of 700 tons each with the greatest of ease. His assignment is to take the barges from the larger towboats on the Ohio and tow them four miles up the Kanawaha River to a rayon manufacturing plant. The Diesel installation is an International engine developing 100 hp. at 1400 rpm. The paddle wheel is driven by a 108-foot belt drive connected to the Diesel by a Twin-Disc marine gear.

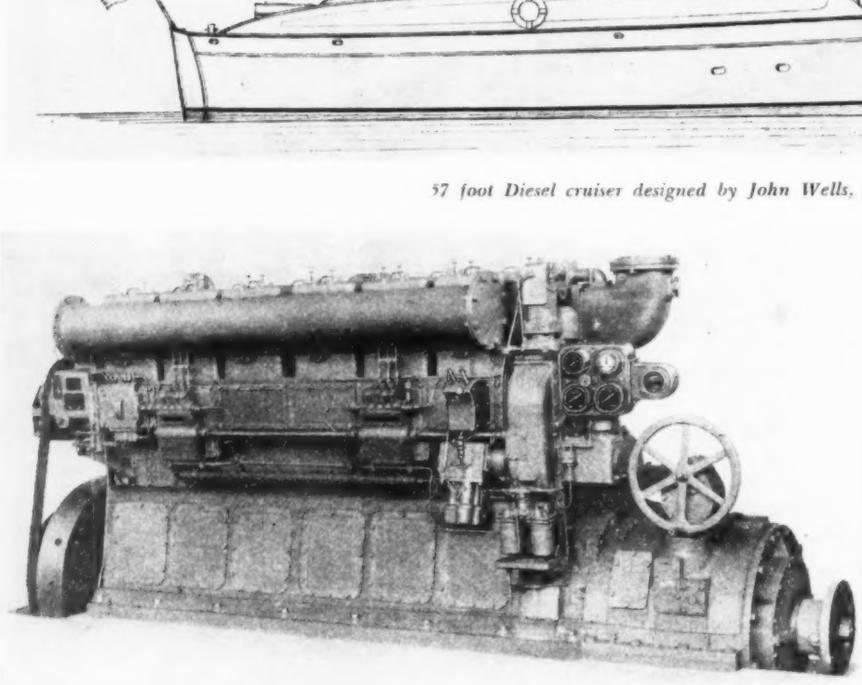


International Diesel, 100 hp. at 1400 rpm., powers "Joe S."

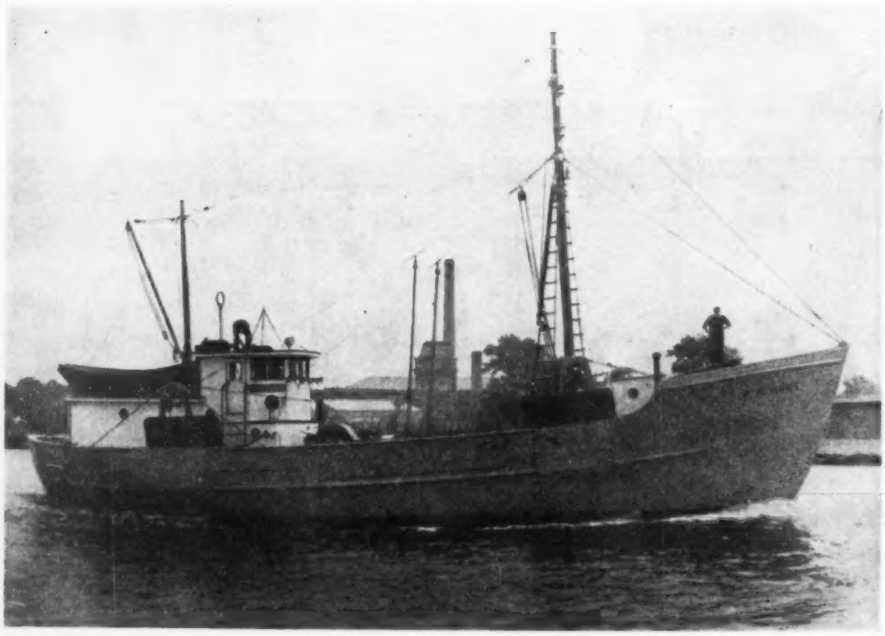
The "Joe S" is a Diesel towboat that can handle tows 60 times her weight. She is 57 feet in length and is powered by an International Diesel.



57 foot Diesel cruiser designed by John Wells, Inc.



Cooper-Bessemer Diesel installed aboard the "P. K. Hunt" develops 260 hp. at 350 rpm.



Colley-Maier designed trawler, "P. K. Hunt," is Cooper-Bessemer powered.

DIESEL YACHT FOR FLORIDA CRUISING

The drawing reproduced in this page is from the board of John H. Wells Inc. It pictures a 57-foot Diesel cruiser designed for Florida use. The plans call for sleeping accommodations for four persons in the guest party and a crew of two. The Diesel installation will consist of two General Motors engines developing 200 hp. each to give the vessel a speed of approximately 16 mph. The engine room is arranged with a steel bulkhead at either end with a watertight door between the engine room and the galley. The cabin arrangement has been used successfully on previous yachts for it gives the maximum amount of available space to the owner's party of four with additional sleeping space in the main cabin.

TRAWLER *P. K. HUNT*

Designed by Colley Maier, this 85-ft. fishing vessel is typical of her kind. Following the fisherman's tradition for sturdy ships, Captain J. O. Bunting, skipper and part owner of the *P. K. Hunt,* followed this example in the way of engines when Cooper-Bessemer made the Diesel installation with a 6-cylinder direct-reversing engine equipped with a sailing clutch. The engine is 4-cycle and has a bore of 10½" and a stroke of 13½". The engine develops 260 hp. at 350 rpm.

Cooper-Bessemer offers several models to the marine industry ranging from 90 to 1280 hp. in the slow and medium speed ranges.

THE *STEEL SYLPH*

One of the sleekest auxiliary sailers of the season is the *Steel Sylph*, a welded steel yawl, designed by Philip L. Rhodes and built by the Arthur Tickle Engineering Works of Brooklyn, N. Y. She is 50′ 6″ overall with a beam of 13′ and a draft of 5′. For auxiliary power she has installed a 2-cylinder General Motors Diesel developing 55 hp. driving an automatic feathering propeller through 2:1 reduction gear. The engine mounting was supplied by the Vibration Eliminator Company and a Morflex flexible coupling is installed between the engine and propeller shaft.

The yacht has accommodation for an owner's party of six and a crew of one. To insure freedom from noise the entire interior of the hull and engine room is sheathed with Johns-Manville insulation. The galley is completely finished in stainless steel and has a coal range fitted with a water heating coil. The interior woodwork is done in bleached oak which makes for a very attractive finish. The General Motors propulsion engine is equipped with a bilge pump. The other pumps are electric driven. The tanks for water and fuel are integral with the hull and are fitted with Pneumercator tank gauges conveniently located.

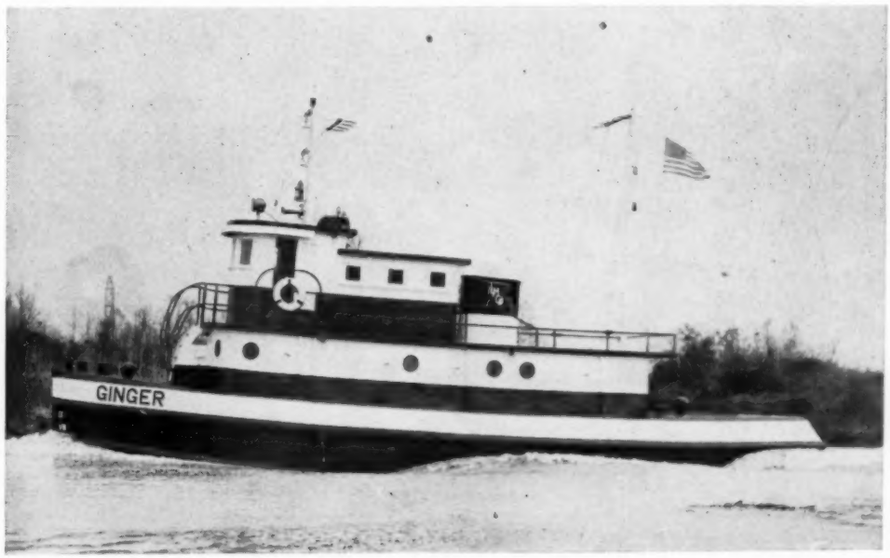
The *Steel Sylph's* rigging is all stainless steel and the spars are hollow Sitka spruce. She is of centerboard design and carries lead ballast to offset the effect of her large sail area. In step with the latest trend in yachting she is equipped with a Hose-McCann combination ship to shore radio and a broadcast receiver. She also has an R.C.A. radio direction finder.

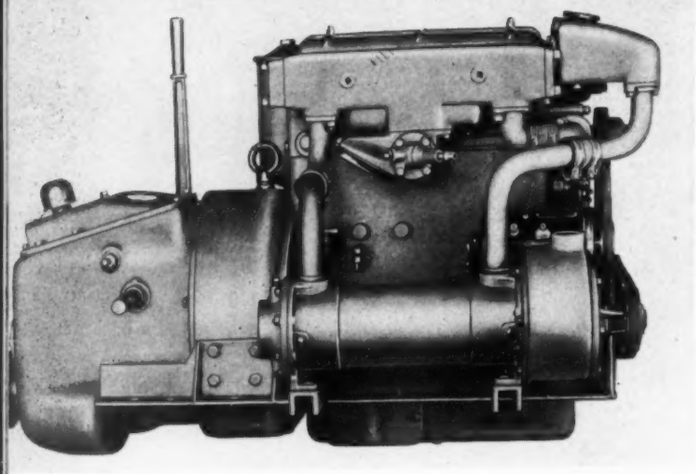
The "Steel Sylph," new all-steel cruising yawl, has a 55 hp. Diesel for auxiliary propulsion. (Below) The tug "Ginger" represents the newest in Diesel tug design. She is equipped with Murphy Diesels developing 300 hp.

TUG *GINGER*

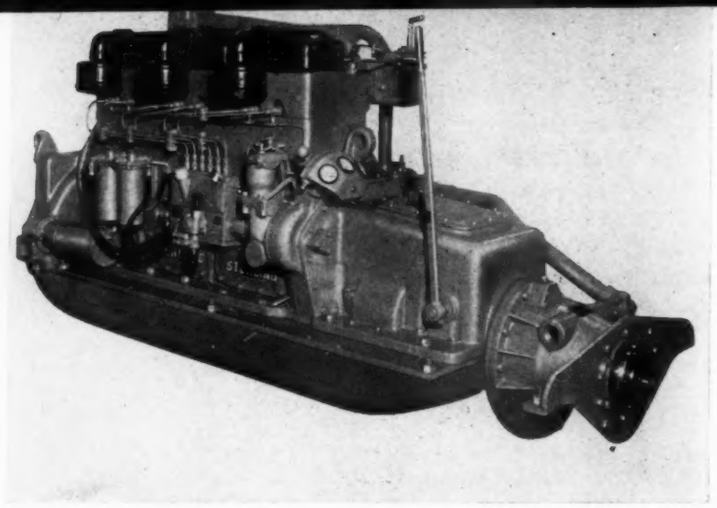
The Calmes Engineering Co. of New Orleans recently announced their latest towboat, a 63-foot, twin-screw tug powered by two 150 hp. Murphy Diesel engines. Equipped with pilot house control operating on the vacuum principle she is easily maneuverable in close quarters. Triple rudders, spaced to avoid heavy propeller wash, contribute to this maneuverability and aid towing considerably.

In the engine room, in addition to the main engines, are the batteries for the 32 volt starting and lighting system, and an 8 hp. Lister Diesel which drives a 5 kw. generator for charging the batteries as well as driving the auxiliary pumps and the air compressor. The main engines drive a fuel transfer and a fresh water pump through an auxiliary drive.



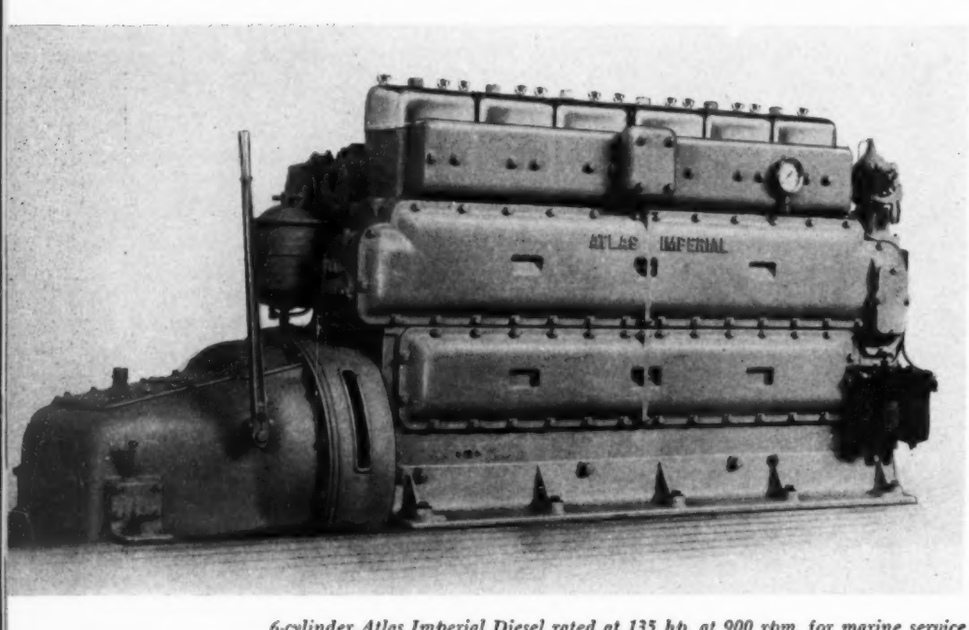


New Gray Marine Diesel, 4-cylinder, 260 cubic inch displacement, equipped with inboard-type heat exchanger and closed cooling system.



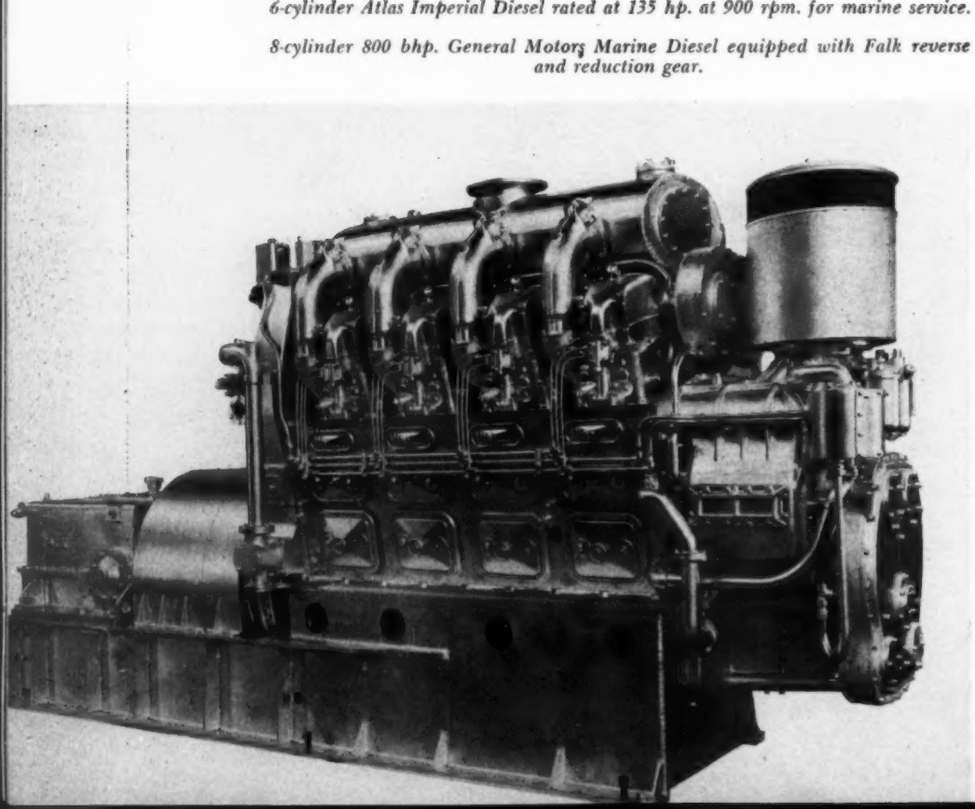
Sterling Viking Marine Diesel, 6-cylinders, developing 85 to 170 hp. at 900 to 1500 rpm. It has a 5½-inch bore and 7-inch stroke.

..AND SEVERAL MORE MARINE DIESELS..



6-cylinder Atlas Imperial Diesel rated at 135 hp. at 900 rpm. for marine service.

8-cylinder 800 bhp. General Motors Marine Diesel equipped with Falk reverse and reduction gear.



GRAY ANNOUNCES NEW MODELS

The Gray Marine Motor Company has released specifications on four new marine Diesels of the four-stroke cycle, high speed type. There are two 4-cylinder models developing 35 and 55 hp. respectively at 1800 rpm., and two 6-cylinder models developing 8 and 150 hp. respectively at 2000 rpm. The engines will be built with Bosch fuel pumps and a special combustion chamber.

STERLING DIESELS IN FULL PRODUCTION

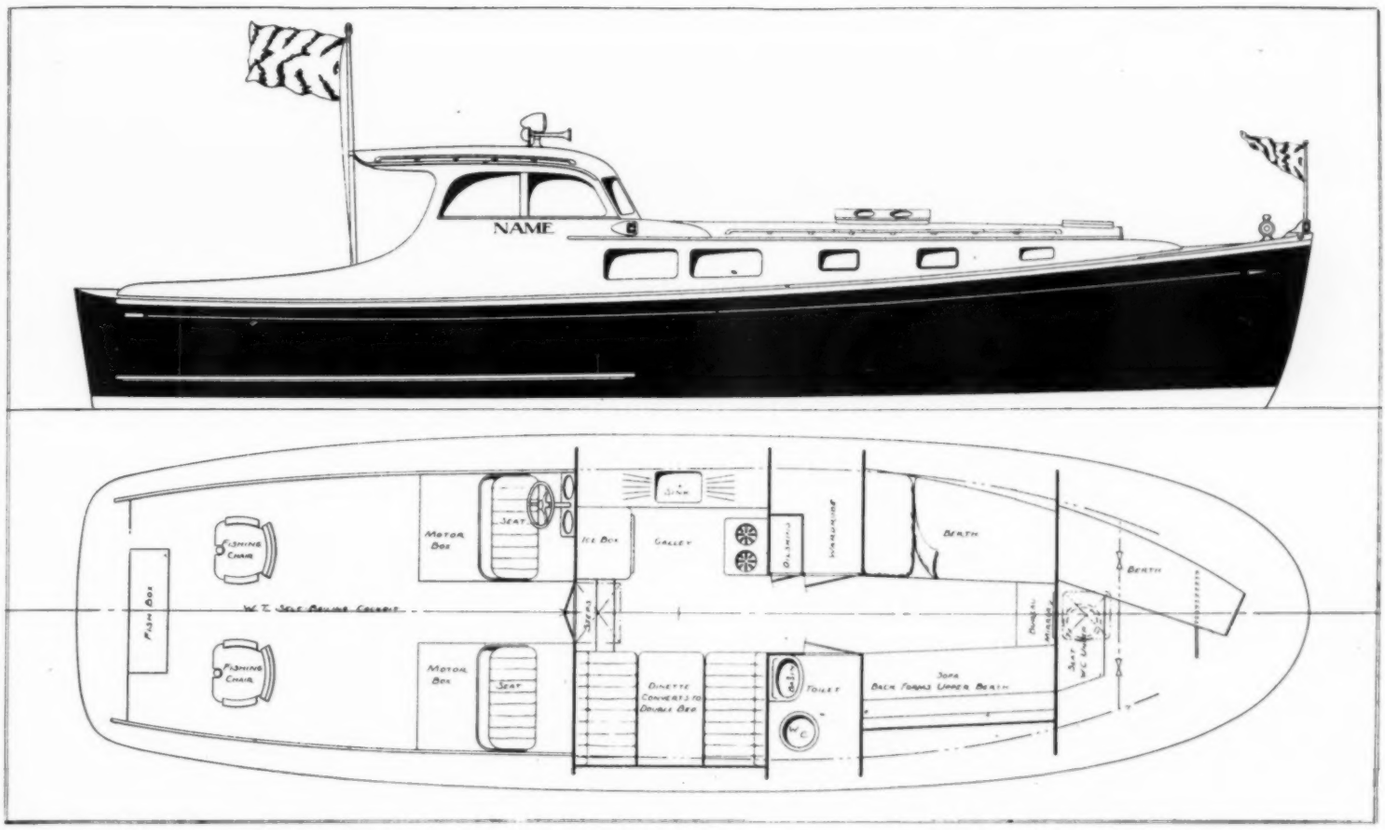
The Sterling Engine Company is now in full production on its marine Diesels which range from 30 to 66 hp. Designed as true marine engines, these Diesels meet the requirements of both work and pleasure craft propulsion. Sterling Diesels can be supplied with generators in cases where electrical power is needed.

ATLAS MARINE DIESELS

The Atlas Imperial Diesel Engine Company has concentrated largely on Diesel installations for commercial fishing boats. Atlas Diesels range from 5 hp. for marine auxiliary installations to 850 hp. for propulsion. The fuel system for these Diesels is of the common rail type with the exception of the smaller auxiliary Diesels which have Bosch injection equipment. Turbocharging is available for two models.

GENERAL MOTORS DIESELS

The Cleveland Division of the General Motors Corporation offers powerful, compact Diesels in its 2-cycle line ranging from 150 to 1600 hp. The list of installations includes vessels large and small with the ore carrier ***E. J. Block*** being one of the most recent. The division specializes in Diesel-electric marine drives.



Deck plan of this Luders 40-footer reveals ample living space for a fishing party. Two General Motors Diesels developing 80 hp. apiece are located under the bridge.

LUDERS WILL SHOW

A FORTY FOOT fishing boat, a design of the Luders Marine Construction Company which will be exhibited at the New York Motor Boat Show, is 40 ft. overall, 11½ ft. beam and 3 ft. draft. It is of wooden construction of the semi-V bottom type which insures both level riding, minimizes rolling, and is combined with ship-shape conventional underwater shape forward, and incorporated in the design is the round deck and extreme flare of the Luders patented bow. The rounded corners of the stern are also of interest as they greatly reduce the danger of damage to the transom edge around docks. The construction is extremely sturdy, single planked, copper or bronze fastened, with three watertight bulkheads dividing the vessel into four watertight compartments.

It is powered with a pair of General Motors Detroit Division 80 hp. Diesel engines, and has a speed in excess of 18 statute miles per hour. The same vessel with a 200 hp. gasoline installation is capable of about 20 miles per hour but with greater fuel costs.

The boat to be exhibited is of the Florida fishing type with quarters, compact and practical, forward for a paid hand, and separated from the owner's quarters by a watertight bulkhead. The owner's quarters consist of a double stateroom with bureau and dresser, exceptional locker space with a separate locker for wet oilskins. There is a toilet room as shown, and a dinette which can be converted into the usual sleeping quarters; the galley with Shipmate gas stove is of generous size. The headroom below is more than ample for a tall man, and the general feeling in the vessel is of being on a small ship rather than on a motor boat.

The steering is done from a bridge which in turn encloses the machinery. In fact, there is a trunk or bridge each side, one for the operator and one for passengers. The operator's position being particularly well situated so that he may watch the fishing and manipulate his ship as may be necessary in landing a catch. There is a watertight enclosure over this bridge with drop windows, windshield, and the same spaciousness that maintains below.

In order to anticipate the difficulty of getting good visibility going into a harbor on a wet night and picking up or distinguishing lights through a wet windshield, there is an inconspicuous sliding hatch over the helmsman, a sort of "sunshine top," which as in a taxi may be slid to one side and allows the helmsman to stand up, the seat folding up and out of his way to give him the necessary leg room, and he is then in a position with his head above the shelter roof which gives him complete vision all around, and is also extremely practical when endeavoring to locate feeding fish that may be playing about.

At a speed of about 18 miles per hour, the vessel has a cruising radius of about 350 miles, which might easily be doubled by reducing speed to 10 or 11 miles an hour. About 90 gallons of fresh water is carried in a stainless steel tank. Outriggers, fish and bait box and suitable chairs are provided as its fishing equipment. Yes, she's well fitted out.

DOCKING THE *QUEEN ELIZABETH*

THE docking of the Cunard-White Star luxury liner, *Queen Elizabeth,* in New York recently was accomplished in a minimum of time. From the moment she arrived up the Hudson River off Pier 90 it was not over a quarter-of-an-hour before she had entered the dock and was warped at her berth. She had come to a stop practically in line with the dock; the tugs gently nosed the bow of her 83,673 gross register tons around with the greatest of ease, and she glided into position without the slightest fuss or incident. No pivoting of her hull against the pier was necessary—there was a powerful Diesel engine in each of those seemingly tiny tugs.

It was the swiftest and cleanest of the hundreds of ship dockings that the writer has seen, and on this occasion he was watching from an advantageous position aboard a special observation tug. Conditions were excellent—slack tide, gentle wind, no ice floes and visibility was excellent. The twelve tugs did a perfect job.

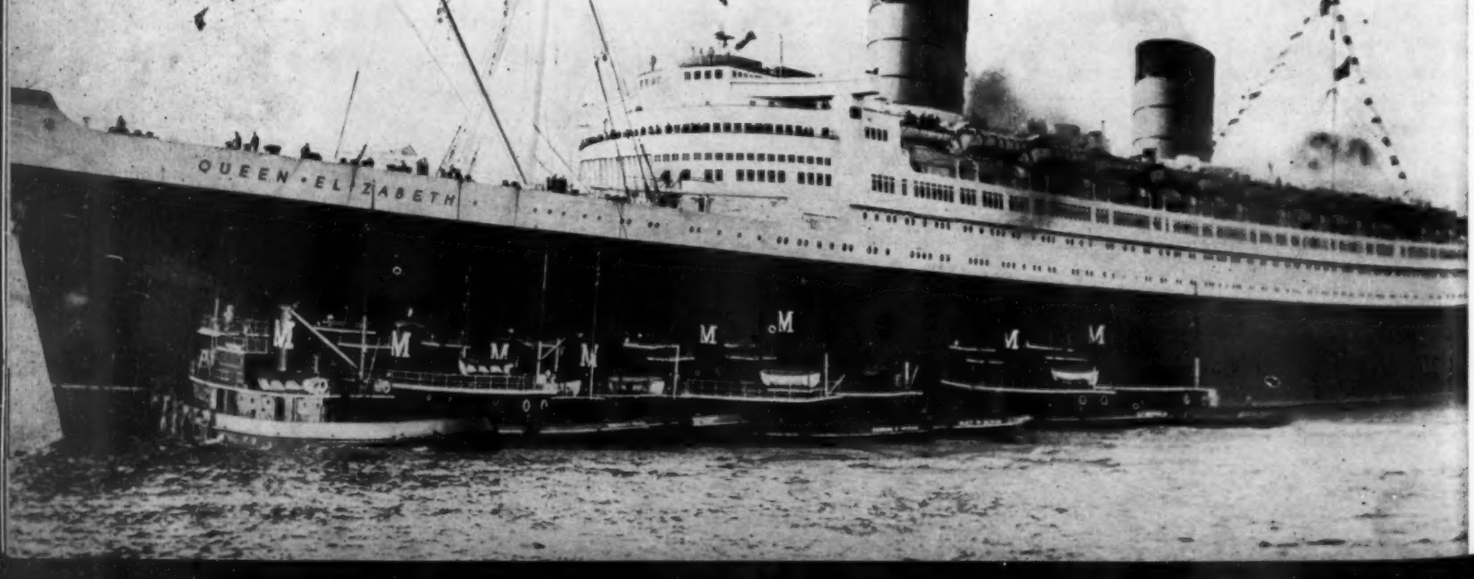
The Diesel tugs being more powerful than the "steamers" were lined-up nearest to the port bow where the hardest pushing was required. Six tugs were engaged at that point, while six tugs were busy at the stern, in addition to the ship's 200,000 hp. turbine plant. Generally, from 10 to 14 motor and steam tugs are required to dock a large passenger liner at New York, depending upon the strengths of tide and wind, or ice floes. Even with the efforts of such a big fleet, plus some of the liner's own propulsive power, it often takes about 45 minutes to pull, push and nose her alongside the berth. The Moran Towing and Transportation Company are noted for "can't be done" accomplishments, and this was one of them, for they count their time from the moment the tug commodore, who acts as pilot, boards the liner about a mile before reaching the pier, until the pier lines are secure.

Great care and good judgment is essential when little boats "push around" big ships, and until the last hawser is made secure it always is a worrying task for the docking pilot who is responsible to the ship's captain. The skippers of the attending tugs, too, must rely upon his giving clear signals. To direct the tugs at the bow he uses a Bosun's whistle, and for the tugs pushing and hauling at the stern he signals with the ship's siren, and so prevents confusion. The steamer's office picks the tug captain which they think is the best docking pilot, as pilot, and he takes his station on the bridge of the liner. When the *Queen Elizabeth* sailed for the return voyage Captain Chester Evans was the pilot. He and Captain Mason alternate in docking and sailing the big liners.

Reliability of the propulsion machinery consequently plays an important part in the economic operation of Moran's large fleet because all of them must be in perfect running condition when they get their towing and docking orders by shore-to-ship radio telephone. When a huge liner like the *Queen Elizabeth* is being docked she might be likened to a floating dam across a strong current. She will not always be favored with a slack tide, so during the docking procedure her 1,031 ft. length will be broadside for a while to the tide.

Morans operate a fleet of about 34 tugs, of which 19 are Diesel engined, and all but two of the latter have General Motors-Cleveland engines. A typical example is the *Thomas E. Moran,* which helped dock the *Queen Elizabeth.* She is 105 ft. long by 26 ft. beam and 11½ ft. draft, and is powered by a 12-cylinder, two-cycle engine, which develops 1,200 bhp. at 750 rpm., the electric transmission and gearing turning the propeller at 160-200 rpm. according to towing or docking conditions. This engine was installed in 1941, replacing an old Diesel engine of 800 hp., and which occupied nearly three times the space of her present engine.

The luxury liner "Queen Elizabeth" guided by a sizeable fleet of Diesel tugs, comes in to her New York berth after her first "civilian" voyage.



WE MUST HAVE A STRONG MERCHANT MARINE

By R. EARLE ANDERSON*

THE American Merchant Marine is facing a crisis. It is not the first time in its history that such a crisis has had to be faced. If history repeats itself, as it so often does, we shall throw away the opportunity we now have to carry through a constructive maritime policy, just as we did after the first world war.

American shipping on the high seas prior to World War II constituted only about fourteen per cent of the world's total. Today, we have a merchant fleet that exceeds in tonnage the combined merchant fleets of all the rest of the world. This may look, at first blush, more like achievement than crisis. Unfortunately it is difficult for the general public to realize how critical the situation of our shipping really is.

All of our merchant fleet was operated during the war by or for the government. Most of our existing fleet was built to meet war requirements. We face the problem of transferring our merchant marine from government ownership and operation to private ownership and operation, and at the same time of reconstituting the fleet so that the needs of our waterborne commerce, both foreign and domestic, can be met. And the competitive situation in world trade and in world shipping is such that an adequate American merchant marine, even utilizing existing ships, can be a going institution only with some degree of government support. It is necessary therefore that we have a constructive national maritime policy, backed by an informed public opinion.

What are the elements of such a maritime policy?

Fortunately an outline exists in the 1936 Merchant Marine Act, which declares the necessity of a commercial fleet adequate for the national defense and for carrying of a substantial portion of our domestic and foreign waterborne commerce on all essential trade routes.

But this statutory statement is a guide post only. It is one thing to spread a policy statement on the pages of the law; it is another thing to carry it out. America must decide whether it is to utilize its present opportunity to maintain a fleet of merchant vessels commensurate with its needs, or whether it will abandon the sea to our competitors and accept the inevitable results.

In the period between the two wars, the carrying of our foreign trade, both exports and imports, was handled mainly by ships under the flags of other maritime nations. Some of these nations used their control over shipping quite definitely to encourage their own commerce even with countries that were natural customers of the United States, drawing off American trade into their own channels. This was the case, for example, with the Germans, in their relations with Latin America, currency controls, barter and shipping facilities being all linked to their own artificially stimulated advantage and to American disadvantage. Other maritime nations, such as the British, while they adhered to the rules of the game, quite naturally favored their own interests in the ocean transport of goods, also at times to American disadvantage. The Japanese built up a powerful merchant marine with a view to its ultimate employment in war, and kept it artificially alive by forcing the use of Japanese bottoms for the carrying of their silk into United States harbors and for their trade with the other Americas.

We were blind to the significance of all this, and allowed our merchant marine to dwindle, until it was carrying only about one-fourth of our overseas commerce. This was an average; on many of the great trade routes of the world it was much less than one-fourth. Shipbuilding in the United States during this period was virtually at a standstill.

Then when the nation was plunged into war it was suddenly brought face to face with the fact that it lacked the ships without which a war away from our own shores could not be fought; lacked them woefully, and at a time when the Battle of the Atlantic was rapidly shrinking the tonnage of our allies to a point that narrowly verged on catastrophe. This is the history that must not be allowed to repeat itself.

If we are actually to carry through with respect to our shipping, with a real national maritime policy, and not merely a praiseworthy verbal statement filed away among Congressional documents, certain positive conditions must be constructively dealt with.

The first and most important of these conditions is a realization of the importance of merchant shipping to our national safety. There has been a growing popular idea that the advent of the atomic bomb has so changed things that the implements of war that have served in the past now all belong on the scrap heap. It is a dangerous idea. The atomic bomb is indeed epoch making. But our declared national policy on which the Baruch plan is based is directed toward outlawing the atomic bomb as an instrument of war. If that plan prevails, we are back where we were before Hiroshima. If it does not prevail, we must still realize that the bomb cannot distinguish between combat troops and civilian population; it can terrorize, but not conquer. Armies will still have to fight armies; conquest will still require occupation of objective areas: occupation will still require troops, and troops, if they are to operate overseas rather than in our own land, will still require ships.

Almost equally important is the grasping by our people of the basic but elusive fact that a merchant marine is vital to the health of our foreign trade. There is a persistent idea, grounded in somewhat superficial economic theory, that we can increase our foreign trade by letting other maritime nations do our overseas carrying for us, partly because they can do it more cheaply than can we ourselves, with our higher wages, and partly in the belief that the dollars we pay to foreigners for ocean transportation will come back to us in payment for exports.

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* *Formerly Director of Finance, United States Maritime Commission.*

Lower engine room deck view on the "Surprise," looking between the two 3000 hp. Nordberg main Diesels.

If our foreign trade were always to remain at a fixed volume there might be something to this idea. But we ought to be concerned with increasing the grand total of the business we do with the rest of the world. Growth is necessary to health, and business prosperity depends on growth. Our theories of economics must be based on the conception of an expanding foreign trade. To bring about such an expansion we need to utilize every means available. Shipping is one of the most important of these means. To throw all our foreign contacts into the hands of foreign competitors and then expect them to build up our business rather than their own is absurd. We don't do that on Main Street; why should we do it on the high seas?

A third essential is that the transition from government to private operation be carried out as rapidly as possible. The Maritime Commission is doing all it can to bring this about. But an unsympathetic and vacillating Federal Treasury position with respect to the tax provisions of the Merchant Marine Act is making the process difficult, and a consistent Administration policy that might perhaps serve to guide the Internal Revenue Department seems to be lacking throughout.

The seriousness of the martime labor situation is another of the major factors affecting the working out of a constructive shipping policy. Seamen have for ages been the under-dogs, and it is perhaps forgiveable that they should attempt to make the most of the present situation to better their lot. But American seamen are in competition with the seamen of all other nations. The maritime strikes of the fall of 1946 have done much to drive ocean-borne traffic away from the American flag. There is serious fear that our American seamen are destroying their own opportunity as well as the opportunity of the nation as a whole.

As to the ships themselves, the fact that we have more ships in total than we can possibly use commercially tends to obscure the fact that there is need for a certain amount of continuing construction.

The war produced practically no vessels suited to the domestic coastwise services. From the national defense standpoint a substantial coastwise fleet is of prime importance, for vessels that operate in home waters are most quickly available in an emergency. To operate economically, however, coastwise ships must be of size and speed adapted to their particular routes and ports, and often must be specially designed. Moreover this service presents both the greatest opportunity and the greatest need for mechanical improvements to facilitate and cheapen the handling of cargo.

Unfortunately our coastwise vessels must compete with transportation by land, and competing ships are a thorn in the flesh for the railroads. The rate structure, and particularly the division of rates for combined rail and water hauls, have been designed to discourage the domestic shipping lines. The Maritime Commission is at the present time trying to persuade the Interstate Commerce Commission to agree to a revision of rates and so make possible the re-establishment of old coastwise services.

We also lack adequate passenger vessels for the major routes serving our foreign commerce. The number of vessels needed for this purpose is not large. The vessels themselves are however in the higher cost brackets, and as they must be built with government aid, they loom up as important from the federal budget standpoint.

As a part of the provision for the national defense, a reasonable fleet of passenger ships, capable of transporting large numbers of troops quickly and at speeds well above convoy speed, is a "must." Commercially, our relations with parts of the world where there is real opportunity for establishing and building up our foreign commerce make it imperative that suitable passenger accommodation under the American flag be available. Unless we can offer service consistent with the speed, the passenger traffic, especially from Latin America and the Orient, is apt to go elsewhere, and with it will go much of the broader commercial relations.

Quite aside from the military and commercial need for passenger ships themselves, their present construction would be an important factor in tiding over an impending period of inactivity in our shipyards, until such time as building for replacements can become available to keep our shipbuilding art from being atrophied.

The problems involved in providing for future current replacements by means of some consistent program of ship construction are intriguing. The ideal of having about five per cent of the active commercial fleet replaced annually can probably never actually be realized. But the objective of a merchant marine that keeps itself up-to-date by some reasonably rational program of building is something that can at least be kept in sight. Such a program almost certainly must be worked out with government aid, and to a considerable extent under government auspices. Its inauguration, therefore, is part of the problem imposed by our shipping crisis. Foreign shipyards are crammed with work, and competing maritime nations are going to have commercial fleets that can soon render our own merchant marine obsolete, de-

spite our present preponderance of tonnage, unless we do something about it. We must avoid a repetition of the "one-hoss-shay" merchant marine of the between-wars period.

A logical replacement program must provide scope for constant technical improvement. There are three principal fields for such improvements: Safety, Cargo-handling, and Propulsion. As to safety, America is well in front and may reasonably be expected to remain in the lead. Cargo-handling improvements are intimately related to port facilities, and the improvement of our marine terminals offers a tempting field from an engineering standpoint, but a difficult one politically.

It is with respect to ship-propulsion that there is still a wide-open challenge to our technical professions. The steam turbine has been brought to a high stage of efficiency in this country, and development of the art of gear-making, especially during the war, has made the turbine a favored prime-mover in the marine field. But we are still in the area of experiment with high steam temperatures and pressures.

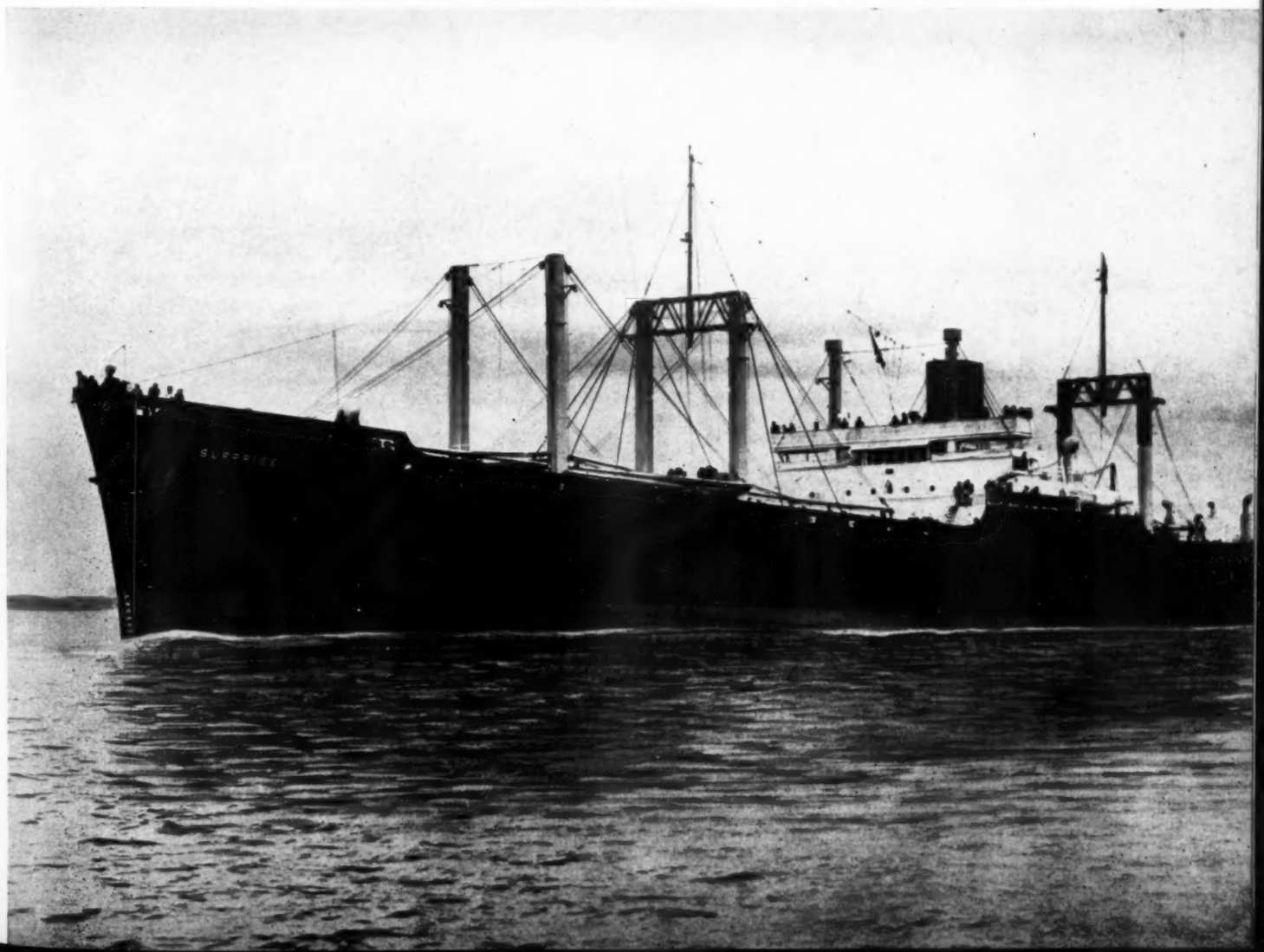
Turbo-electric drives have also given an excellent account of themselves mechanically, but there is a serious problem still to be solved.

The gas-turbine for ship propulsion holds much of promise. It has been successfully used on shore installations and has been experimented with for airplanes. If it can be perfected for marine use, either for main engines or auxiliaries, it may help to keep us in front technically.

Unfortunately, the Diesel engine has yet to come into its own in American merchant ships. In Europe it has long been a favorite, with both ship-builders and ship-operators. Much progress has been made in this country under the stimulus of the war shipbuilding program, and our American Diesel engines are probably equal to the best. But they still lack wholehearted acceptance by ship operators. This has been due in the past principally to three things: a high first cost for the marine Diesel installation as a whole, unsatisfactory experience with respect to ordinary upkeep, especially voyage repairs, and lack of expeirenced Diesel operating engineers. The American Diesel-engine industry has the problem right in its lap. *(And the Diesel industry is doing something about it. These three factors, previously acknowledged as deterent to Merchant Marine Dieselization, are now definitely relegated to history. The concise and factual answers to them were given in the San Francisco Marine Conference reported in the December 1946 issue of* DIESEL PROGRESS.*—Editor.)*

These then are the challenges to America growing out of our shipping crisis. They must be met by applying sound business sense and technical skill to our merchant marine. Above all, we sorely need a virile national maritime policy, kept free from politics, and supported by informed public opinion that recognizes the necessity of an adequate merchant marine for our national security and for our domestic prosperity. The problems involved are difficult, but they are not beyond solution.

United States Maritime Commission C-2 cargo vessel "Surprise"—one of our larger Diesel ships.



AVONDALE CLIPPER *MAURITANIA*

By DWIGHT ROBISON

EARLY in 1946 James H. Bull, president and general manager of Avondale Marine Ways, Inc., New Orleans, came back from a trip to the West Coast. His pockets were stuffed with contracts for all-steel tuna fishing vessels, and a set of plans drawn up by Naval Architect G. Bruce Newby of Long Beach, California, father of the modern tuna clipper.

Avondale lived up to its reputation by turning out their first 132-foot, all-steel clipper, the *Mauritania,* in little more than four months and then launched, in rapid succession, the *Paramount,* the *Sun Hilarita* and the *Sun Jason.* All of them are big, powerful cargo yachts, fitted out with the most modern equipment and designed to spend months at sea.

Members of Avondale's "production team" do not consider this an unusual feat. They have been breaking shipbuilding conventions ever since the yard was started, in 1938, on the west bank of the Mississippi River on which was formerly the ferry landing of Southern Pacific Railway. The railway used this landing before the construction of the Mississippi River bridge when all trains from the west had to be ferried to the east bank of the river. The foundation for the railway landing was converted into Avondale's present marine railway, a conversion that has paid off.

Recently Avondale purchased another site on the Harvey Canal (intracoastal Canal) about a half mile from its junction with the Mississippi River. This new yard, formerly the property of River Terminals Corporation, is being converted into a quick-repair shipyard. Installation of a dry dock will permit Avondale to turn out all types of marine repairs. Mr. Bull estimates it will more than double Avondale's capacity.

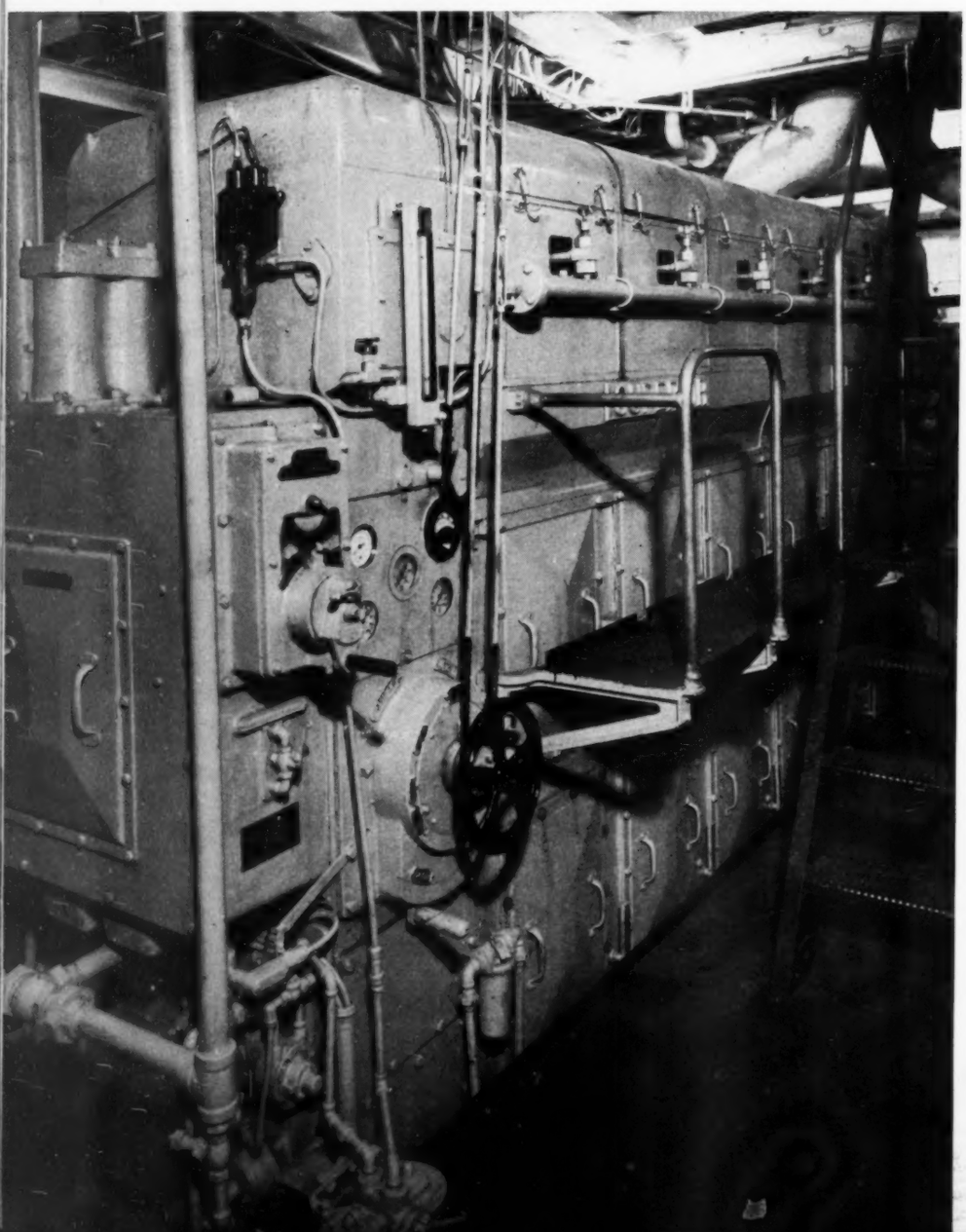
Incidentally, the construction of tuna clippers is not Avondale's only venture in the fishing boat building field. Simultaneously with the building of the four big tuna clippers, the Avondale yard designed an all-steel, 65-foot shrimp trawler and has produced them in assembly-line fashion. This sturdy Diesel-engined trawler has become popular, during the past year, in the fishing fleets of the Gulf of Mexico and the Mexican shrimping center of the Gulf of California.

Avondale had to prove, beyond the point of speculation, that its shrimper was seaworthy. Having sold an even dozen to two Mexican packing concerns—Productos Conjulados and Productos Marinos—Avondale had to deliver them via a 5,000-mile deep sea voyage across the Gulf of Mexico, through the Panama Canal and up the west coast of Mexico to Gueymas, on the Gulf of California. Furthermore, at least half of them were delivered during the height of the hurricane season in the Gulf of Mexico—a gruelling "shake down" for any vessel, large or small.

Avondale is probably proudest, however, of its well equipped, finely appointed tuna clippers. The *Mauritania,* first of the four vessels (and the first of its type to be constructed on the Gulf Coast), is powered with an 840 hp., 14½ x 20 Superior direct reversible Diesel, which turns up 300 rpm. It swings a 78" propeller, giving the vessel a cruising speed of 11 knots. Auxiliary machinery consists of two 125 kw alternating current generating sets located in the machinery compartment.

The clipper is designed to carry 325 tons of tuna fish in ten refrigerated compartments. Refrigeration consists of a brine quick freezing

Main engine of the "Mauritania." This 840 hp. 14½" x 20" Superior direct-reversible Diesel turns up to 300 rpm. and will drive the clipper along at a cruising speed of 11 knots.



First vessel of its type to be constructed on the Gulf Coast is the Diesel-engined clipper "Mauritania." She is the first of a series of 132 ft. all-steel tuna boats built by the Avondale Marine Ways, Inc.

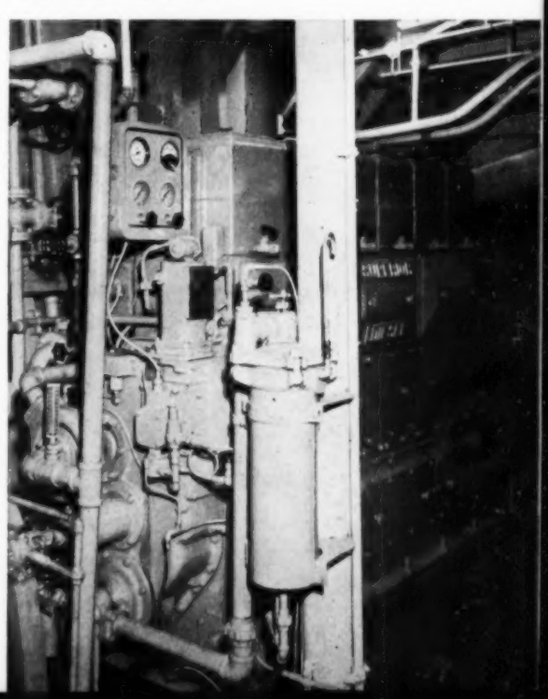
system servicing the ten brine wells and two bait tanks. The refrigeration machinery consists of three (6 x 6) Kohlenberger Compressors, driven with thirty hp. Westinghouse motors; one ammonia condenser; two ammonia receivers; twelve two-inch brine circulating pumps powered with two hp. electric motors; cooling coils, piping, regulators, thermometers, gauges and gauge board.

Fuel is carried in tanks in the inner bottom section of the vessel. Deep tanks are located fore and aft, and carry enough fuel to provide a cruising range of more than 10,000 miles. The hull structure is subdivided into five transverse oil and water-tight bulkheads and transom bulkhead extending to the main deck. This provides compartments for trim tanks, chain locker, machinery, fuel oil, fresh water and the refrigerated brine wells.

Each vessel carries a crew of 15 men and the living compartments are as finely appointed as a yacht, which the clipper closely resembles. The galley and mess room—a spacious compartment—is located on the main deck and is equipped with modern electric range, hot water heater, tile drain boards and a Douglas fir dining table. Food storage and refrigerator rooms are located in compartments forward.

The four ships are identical in construction and equipment, except that the *Paramount* is powered with a 1000 hp. Superior.

One of the two 190 hp. Superior Diesel generators aboard the "Mauritania."



NORDBERG ANNOUNCES NEW DIESEL LINE

Four-Cycle, Heavy-Duty, Medium Speed Engines Offered for Marine and Stationery Uses

THE long-awaited news is out. Nordberg Manufacturing Company will unveil, to public view for the first time at the New York Motor Boat Show, its new 9 x 11½, four-cycle Diesel series for heavy-duty, medium speed service in marine propulsion, marine auxiliary and stationary applications. Available in 6, 7 and 8 cylinder models, naturally aspirated or supercharged, the new series presents a sleek, business-like appearance. The engine is fully enclosed and embodies interesting design features leading to compactness, simplicity and accessibility.

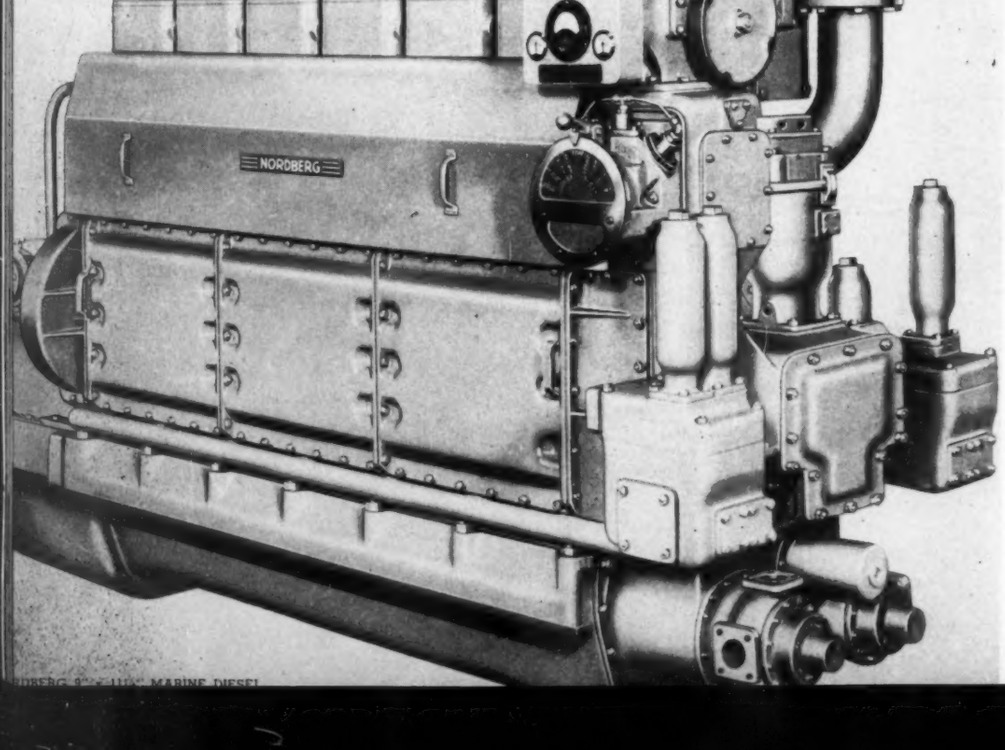
The marine Diesel models are direct reversing and designed for application to a wide range of craft. All models are available in port or starboard arrangement and for direct or reduction gear drive. For marine propulsion, engine speeds of 600 to 720 rpm. are recommended. In-line reduction gears are available in ratios from 2.71 to 4.0 to 1. The reduction gears used on Nordberg engines are the in-line planetary type resulting in a compact unit of maximum efficiency, and permitting a lower installation of the engine. A sailing clutch is available to permit operation of the engine for driving of auxiliary equipment through a forward power take off when the propeller shaft is disengaged.

All of the marine models are designed with connections for pilot house control. The controls are so designed to meet the varied requirements of the marine field.

For marine auxiliary or stationary Diesel generator service, the engine and generator are mounted on a common steel fabricated subbase forming a compact unit readily adaptable to a wide range of applications for both AC and DC power generation.

The engine bedplate is a one-piece casting of fine grain high tensile iron extending the length of the engine and serves as the lower half of the crankcase. Heavily ribbed and transverse sections provide rigid support for the crankshaft and bearings. Broad flanges and bosses along the sides provide a rigid means for bolting and securing engine to foundation.

New Nordberg 6-cyl., 4-cycle Diesel, 9 in. bore and 11½ in. stroke.



The engine frame is a single casting of alloy iron serving as the upper crankcase and en-block cylinder housing combined, forming a sturdy structure for the mounting of accessories and assuring permanent alignment. The engine frame is held securely to the bedplate by means of tie rods anchored in the base on either side and below each main bearing and extending to the upper portion of the frame.

The tie rods relieve the frame and bedplate of tension stresses set up during the operation of the engine. Large cored areas in the engine frame provide for efficient jacketing and circulation of cooling water. Removable wet type cylinder liners of fine grain cast iron, precision finished, are provided. Neoprene seal rings insure water tight fitting in the engine frame.

Individual cylinder heads cast from heat resisting gray iron alloy are secured to the engine frame with four studs. The combustion chamber is of the open type. Each cylinder has one intake and one exhaust valve which seat directly in the cylinder head without inserts or cages with resultant effective cooling of the valve seat area. The intake and exhaust valves are of heat resisting and non-corrosive steel with stems chrome plated to provide long life and the top of the valve stem faced with stellite to resist wear. Intake and exhaust valves are identical and interchangeable.

Individual valve lever housings cast from fine grain iron are secured to the cylinder heads by means of studs, and contain the valve lever shaft and rocker arm assemblies. Cast aluminum covers are provided fully enclosing the valve lever mechanism and permitting ready access to it.

The crankshaft is forged from high grade carbon steel with bearing surfaces precision finished and polished and drilled for pressure lubrication from the main to the crankpin journals. Oil holes are located in the minimum pressure zone of the crankpin circumference to insure proper lubrication.

The camshaft is of high carbon steel precision ground and polished with valve and fuel op-

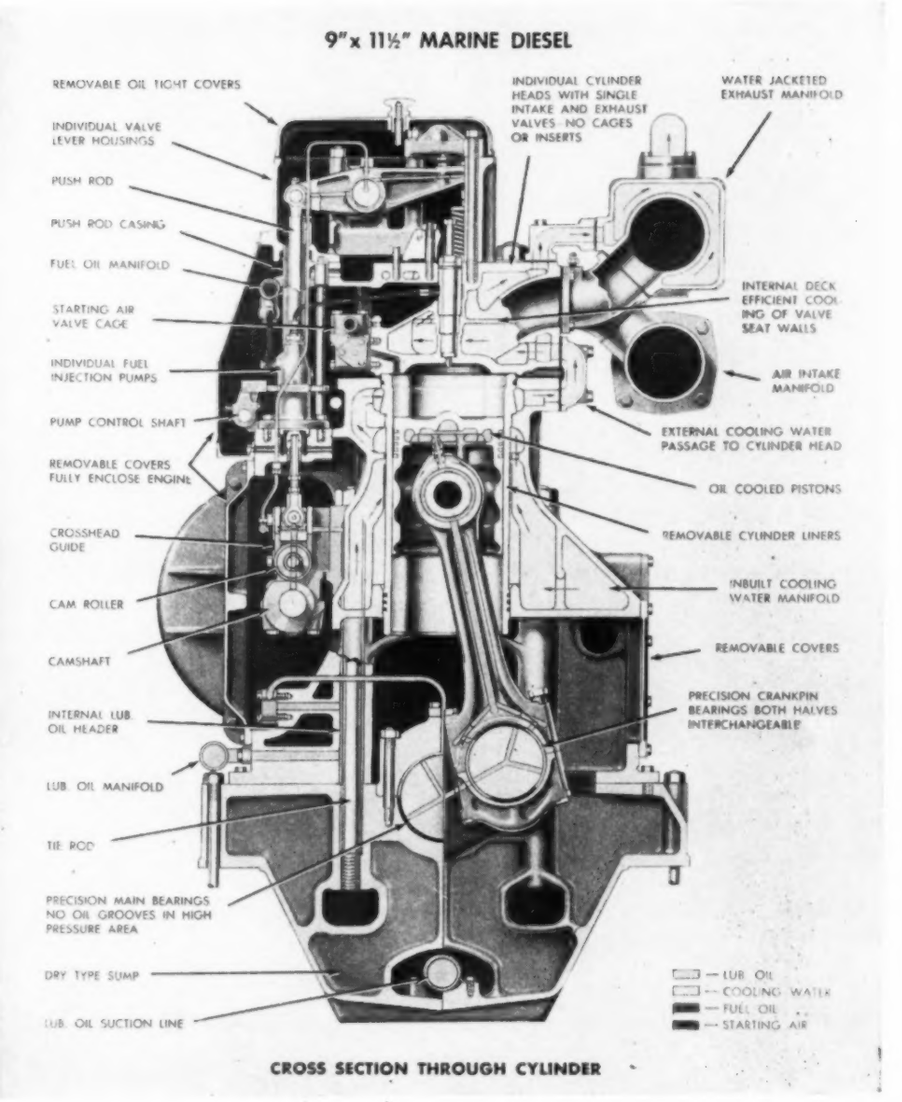
erating cams secured to the shaft and located by keys. Cams are case hardened to provide long life. All timing gears are located at the flywheel end of the engine eliminating undue torsional stress and wear of the camshaft. The camshaft is supported in bearings of cast aluminum alloy secured to the engine frame and pressure lubricated by means of drilled passages from the oil header within the engine frame. The push rods actuating the valve levers are enclosed in a tubular steel casing which fit into the cylinder block. One push rod guide is provided each cylinder and is bolted to the engine frame and so arranged as to serve as a guide for the three individual cam roller crossheads actuating the fuel injection pumps inlet and exhaust valves respectively. The crosshead assemblies are pressure lubricated through drilled passages from the main engine system.

Individual fuel injection pumps are provided each cylinder. Fuel lines leading to the fuel injectors are short and of uniform length.

The engine is started by compressed air and each cylinder provided with an air starting valve pneumatically opened and closed by an air starting distributor driven from the camshaft. A header connection supplies compressed air to each starting valve. An air starting valve cage is bolted to the side of each cylinder head.

The marine engines, being direct reversing, are equipped with a double set of cams for ahead and astern rotation. During the maneuvering cycle, the cam rollers are automatically lifted from the cams and the camshaft shifted into operating position corresponding to the desired ahead and astern rotation.

Two lubricating oil pumps of the Tuthill internal gear type are mounted at the forward end of the engine and direct gear driven from the crankshaft. The pumps operate with equal efficiency in either direction. Lubricating oil from the pressure pump is delivered to a lube oil manifold and then to an internal lube oil header which supplies oil to the various parts of the pressure lubrication system. The use of drilled passages from the internal lube oil header reduces the number of oil lines and fittings to a minimum. A special system of rifle drilling of the crankshaft permits continuous lubrication of the main and crankpin bearings without oil grooves in the high pressure area. The reduction gear assembly is also lubricated by a branch line from the engine pressure lubrication system.



CROSS SECTION THROUGH CYLINDER

The piston is cast from heat and wear resisting alloy iron and provided with three compression and two oil control rings. The connecting rod is a high carbon heat treated steel forging designed as an "H" section for uniform column stress in both planes. Rifle drilling provides pressure lubrication to the piston pin of heat treated alloy steel and supplies oil to the jet for oil cooling of the piston.

Either reciprocating or centrifugal type sea and fresh water pumps can be provided. The pumps are mounted at the forward end of the engine.

Approximate Overall Dimensions and Weights of Nordberg 9"x11½" Marine Engines

Model	*No. of Cyls.*	*Height*	*Width*	*Direct Drive*		*Reduction Gear Drive*	
				Length	*Weight*	*Length*	*Weight*
FMD-96	6	6'-8"	4'-3"	11'-11¼"	20,000 lbs.	13'-10½"	20,500 lbs.
FMD-97	7	6'-8"	4'-3"	13'-¾"	23,000 lbs.	15'-0"	23,500 lbs.
FMD-98	8	6'-8"	4'-3"	14'-2¼"	26,000 lbs.	16'-1½"	26,500 lbs.
FMD-96-SC	6	6'-8"	4'-3"	11'-11¼"	21,000 lbs.	13'-10½"	21,500 lbs.
FMD-97-SC	7	6'-8"	4'-3"	13'-¾"	24,000 lbs.	15'-0"	24,500 lbs.
FMD-98-SC	8	6'-8"	4'-3"	14'-2¼"	27,000 lbs.	16'-1½"	27,500 lbs.

ITALIAN MARINE DIESEL ENGINEERING

By ANTONIO GIORDANO

AMONG the problems concerned with the economic reconstruction of Italy is the question of the reorganization of the Italian Shipbuilding Industry. The great dreams of Mussolini to have a mercantile marine competing in the international passenger trade proved to be dangerous to the existence of Italian shipping since the race between the large Italian lines in building larger and larger vessels would have led to their bankruptcy if the Government had not intervened financially through the creation of the Societa Finanziaria Marittima which secured the control of the leading Italian lines in 1938. The new Italy's mercantile marine, according to what can be judged from the information regarding the program worked out by leading Italian shipowners, should be based primarily on the development of coastwise shipping in the Mediterranean with vessels between 1000 and 3000 tons d.w., accommodating from 12 to 24 passengers and with a speed varying between 12 and 16 knots, and on the building of cargo liners from 7,000 to 10,000 tons d.w. with a speed of 15-17 knots.

In order to judge properly the situation of the Italian shipbuilding industry and marine Diesel engineering, it is necessary to take into consideration the prospects of orders from Italian shipowners, though Italian shipbuilders do not overlook the prospect of foreign orders. At present the Italian shipbuilding industry has a yearly output capacity of about 200,000 tons d.w. and is concentrated in the following shipbuilding plants:

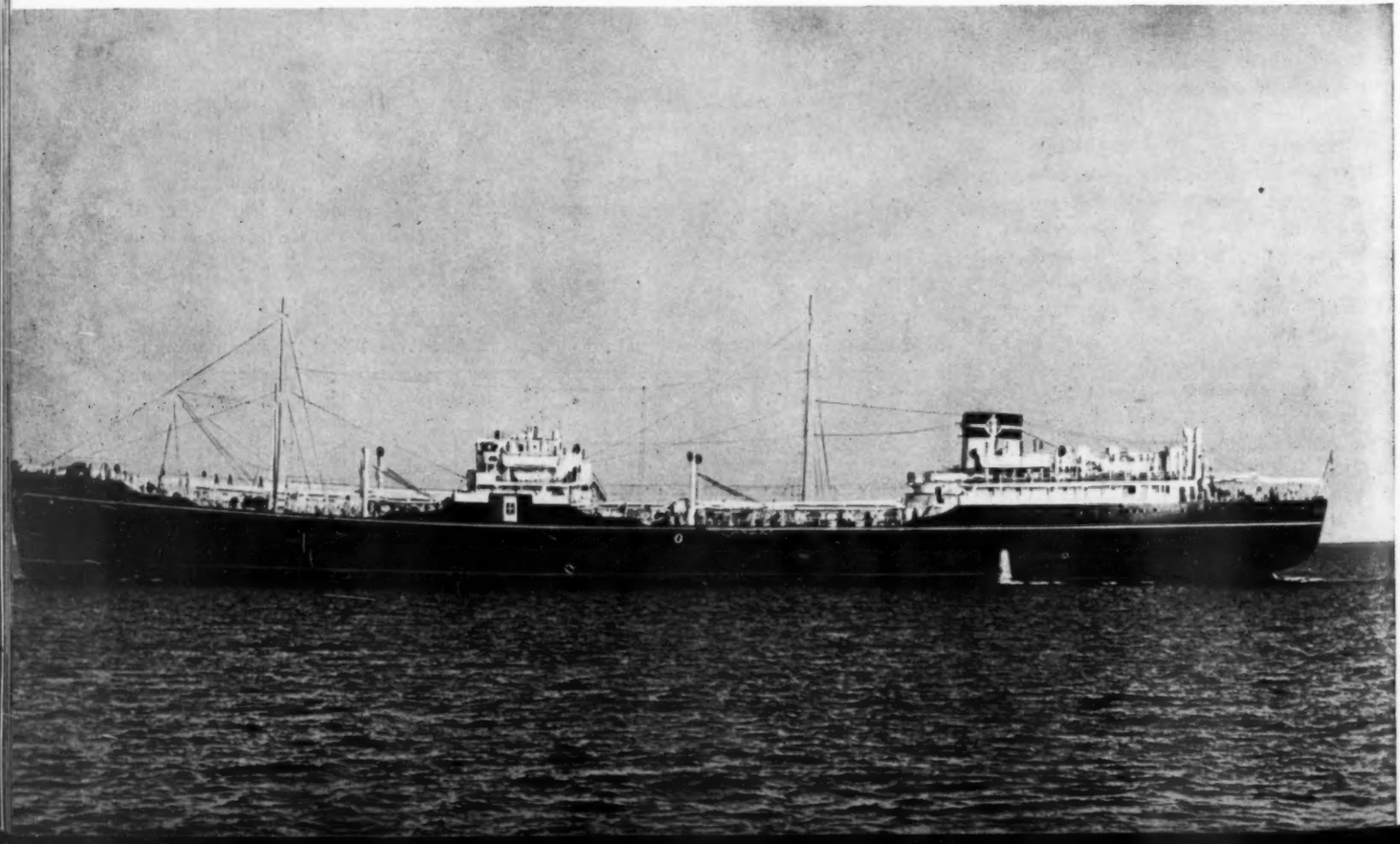
The Ansaldo concern comprises the Genova Sestri shipbuilding plant with 11 berths for the construction of vessels from 1,000 for the construction of vessels from 1,000 to 50,000 gross tons, and the Genova Cerusa ship-plant with 5 berths for the construction of medium and small size vessels. These shipbuilding plants are complete with a fitting-out shop with annexed quay at Genova Sampierdarena in addition to an engineering concern which is undertaking the engineering work necessary to the Ansaldo concern and includes 10 large plants employing at present 30,000 workmen.

In connection with the activity developed by the Ansaldo it should be noted that since the end of the war they have launched the motor liner *Ferrucio Buonapace* of 9,000 tons d.w. fitted with a Fiat double acting, two stroke, nine cylinder, 9,000 bhp. engine, and three motor tankers of the Giacomo Matteotti type of 9,000 tons d.w. all fitted with Fiat engines in addition to several vessels from 1,000 to 2,000 tons d.w. both for Italian and foreign shipowners. They have orders for 9,000 tons d.w. of motor liners of the *Ferruccio Buonapace* type, two 9,000 tons d.w. cargo liners for Norwegian shipowners and are negotiating a contract for three 10,000 ton d.w. motor liners for Turkish shipowners.

Cantieri Riuniti Dell' Adriatico, a consolidation of the three firms, Cantiere Navale Triestino, Stabilimento Tecnico Triestino and Cantiere San Rocco, possesses three widely separated shipyards; the Monfalcone, the San Marco and the San Rocco yards aggregating 18 slips, which allow the building of ships of any type and size up to 50,000 gross tons, an engineering plant, the Fabbrica Macchine San Andrea, where Diesel engines, turbines, reciprocating steam engines and auxiliary equipment are manufactured.

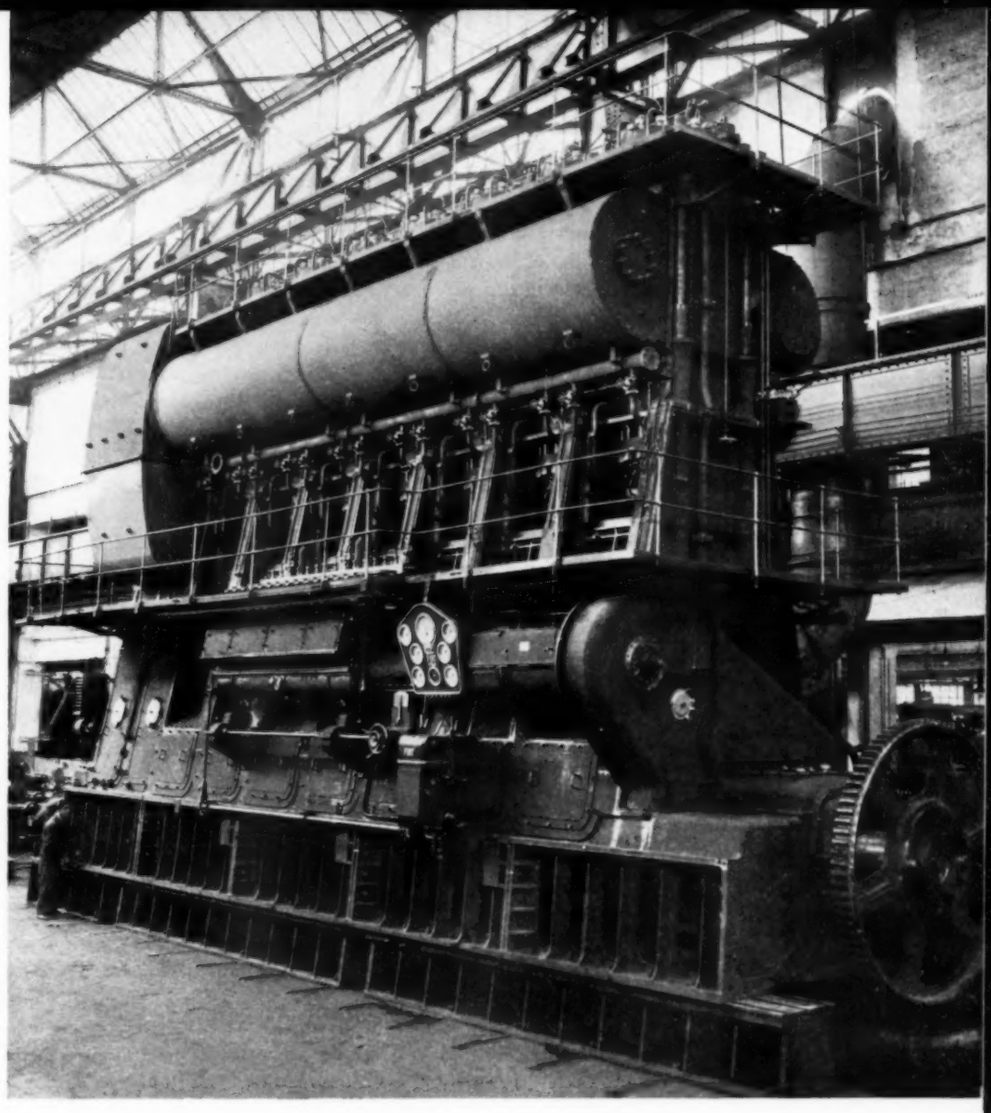
These plants were severely hit during the war

Motor tanker "Franco Martelli," powered with a Fiat, 6-cylinder, double acting Diesel, is owned by Azienda Generale Italiana Petroli of Rome.

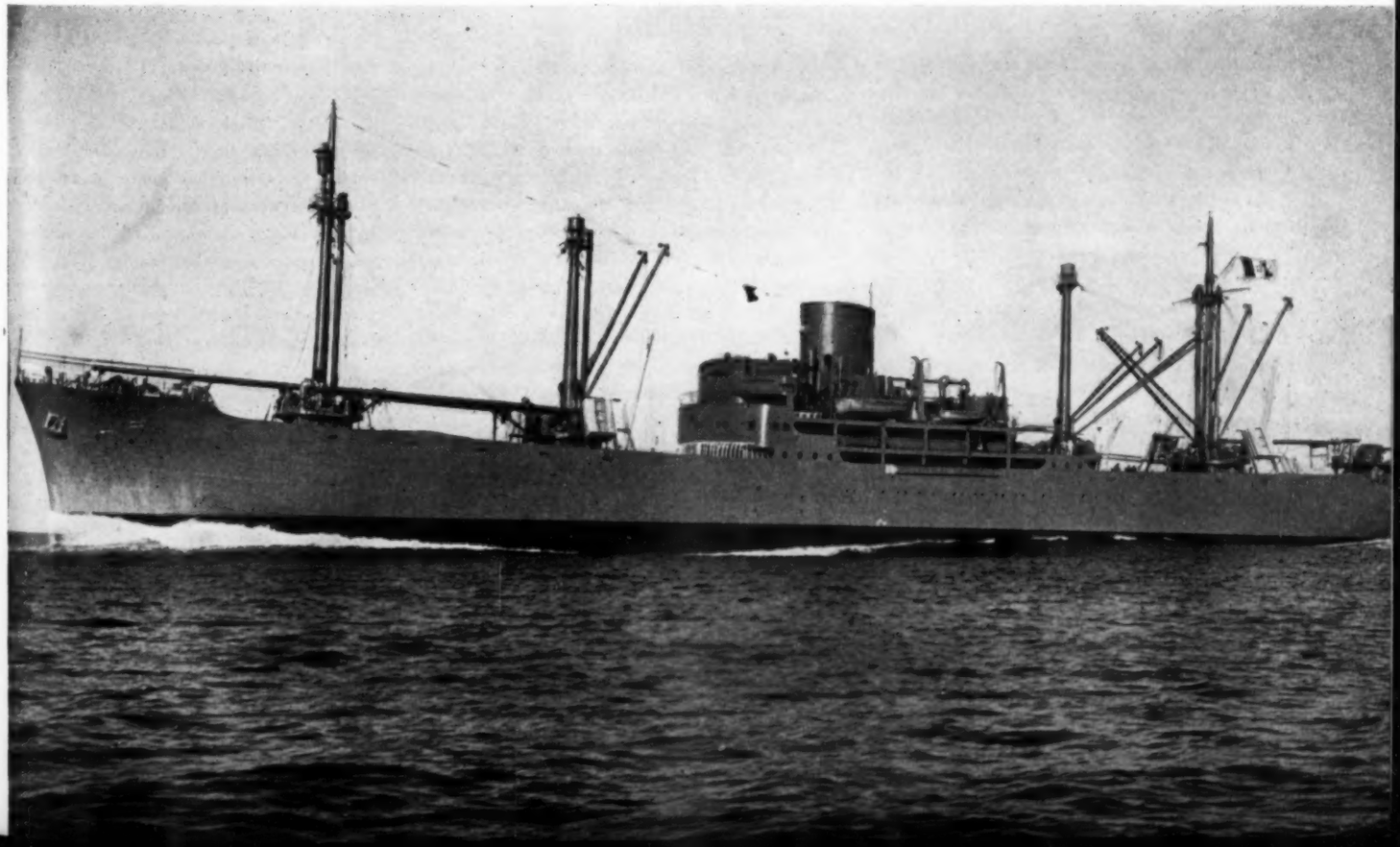


with 70% of the shipyards' plants destroyed or damaged. At present, however, most of the damage has been repaired and the power of production of the C.R.D.A. is about 50% of prewar. The program for complete repairs involves an expenditure of 6,000,000 lire but considerable difficulties are found in the financing of such a scheme. There is doubt that the production of the Italian shipbuilding industry will exceed the future requirements of the Italian mercantile marine. This coupled with the difficult financial position of Italian shipowners, the slow liquidation of the war damages by the Italian Government and the new political situation in the Trieste zone, stands against a speedy expansion. As regards Trieste, several machinery plants are to remain in the international zone with the result that to engine a ship, the Monfalcone shipbuilding yard will be forced to pay duty on the machinery imported from their own Trieste plants.

At present there are under construction at the Cantieri Riuniti dell'Adriatico the following vessels: two 9,000 tons d.w. Diesel vessels for Norwegian shipowners, one cargo and passenger Diesel ship of 9,000 gross tons, one tanker of 12,000 tons net tonnage, three tankers of 9,000 tons net tonnage each, five cargo motorships of 1,000 gross tons each, in addition to some repair work for Italian shipowners and some conversion work of aircraft carriers for Great Britain, but it is evident that such work cannot represent sufficient business for a concern which



Above: Shop view of a Fiat, 7-cylinder, 6000 bhp., double acting marine Diesel. Below: Propulsion unit for the "G. Allegri"—a cargo vessel, is a Fiat, 9-cylinder, 7800 bhp., 175 rpm. Diesel.



used to employ from 20,000 to 25,000 workmen.

The Odero-Terni-Orlando Group includes the Cantiere di Genova Sestri, Cantiere del Muggiano at La Spezia, Cantieri di Livorno and engineering plants which include the former Vickers-Terni plants built during the first world war at La Spezia. These yards have construction facilities for 16 ships.

The Leghorn yard was fully destroyed but the La Spezia and the Genoa plants were only slightly damaged, and as a matter of fact, early this spring the Muggiano yard launched the cargo and passenger motor vessel *Giosue Borsi,* the first of a group of 11 vessels of 4,200 tons fitted with 6,000 bhp. Fiat Diesel machinery, ordered by the Tirrenia Line, and has still on order about 20,000 tons of merchant shipping for Italian shipowners in addition to much repair and conversion work. Connections have been made in Latin America, and especially in Brazil and Argentina for additional work.

Cantiere Navale Franco Tosi at Taranto has steam and Diesel propelling machinery shops at Legnano with facilities to build high-speed superheated turbine sets and Diesel machinery up to 15,000 hp., and also a shipbuilding yard at Taranto with 11 berths. The Taranto yard has a surface of about 50,000 square meters fitted with up-to-date machinery for the shipbuilding industry, and it is interesting to note that in the course of the last few years the Taranto shipbuilding yard has greatly increased the use of electric welding especially in the structural part of the ships just as has been done in the plants of the Cantieri Riuniti dell'Adriatico.

Cantieri Navali Riuniti & Cantieri Del Tirreno shipbuilding yards together with the Ente Bacini operating the drydocking facilities in the port of Genoa, are controlled by the Piaggio group and include the shipbuilding yards and the engineering plants of Ancona, Palermo and Riva Trigoso (Genova) in addition to the engineering works of Genova annexed to the Ente Bacini which is generally engaged in the repairs of the drydock vessels.

The air raids practically paralyzed the activity of all the shipbuilding yards of this group, but since April 1945 the yard has started on its way towards reconstruction and orders for medium size vessels and for repairs are being received.

The following information illustrates the output capacity of these shipbuilding and engineering plants, which together with the Cantieri del Mediterraneo at Pietra Ligure, the Breda Shipbuilding yards at Venice and some other smaller shipbuilding organizations which have remained in the hands of private owners. The rest are at least 65% controlled by the Government. These are the Cantiere di Ancona with five berths of which one measures 200 meters in length and with facilities to build high power steam propelling machinery and Diesel propelling machinery of medium power as well as ship's auxiliaries; the Cantiere di Palermo with five berths and a drydock measuring 171 meters in length and 7.60 meters in breadth—the yard has a railway rolling stock department and before the second world war cargo and passenger vessels of a carrying capacity up to 10,000 tons were built there; the Cantiere Navale di Riva Trigoso with eight wall berths in which vessels up to 200 meters might be built and with engineering shop suitable for the construction of reciprocating steam engines and high power steam turbines, ships auxiliaries and a foundry for pig iron and bronze castings.

The shipbuilding facilities in Italy also include the Royal Naval Arsenal at Castellammare di Stabia, Taranto and Venice which will have to be demobilized in view of the reduction of the Italian Navy. This fact shows that there is no hope for a sound Italian shipbuilding industry unless various Italian shipbuilding plants cooperate in adopting modern methods. The leaders of the Piaggio group are considering the fusion of the Cantieri Navali Riunti, Cantieri del Tirreno and Ente Bacini with a view to creating a single unit and thus reducing the cost of ship construction to competitive levels.

The problem of low cost production is not limited to the Italian shipbuilding industry but covers also the marine engineering and above all the Diesel engineering plants. As a matter of fact, the Fiat Diesel Engine Works in Turin and the Fabbrica Macchine Sant'Andrea at Trieste as well as the Stabilimento Meccanico Ansaldo (Ansaldo Engineering Works) at Genoa building under Fiat license, the Tosi Diesel Engine Works at Legnano and the Fabbrica Macchine Sant'Andrea at Trieste working also with Sulzer and B. & W. licenses have made a great effort to standardize the output of Diesel machinery and thus increase production of engines for new shipping.

In carrying out the program of fitting out the Italian fleet of coasters and other vessels destined for transport between Italy and North Africa, the Italian Diesel marine engine builders used up to 5,000 hp. single acting machinery. Over 5,000 hp. double acting engines were employed.

While Tosi fitted a 1,800 hp. single acting engine on the set of vessels of 2,500 tons d.w., Fiat worked out a standard type of single acting engine which in normal service could develop about 4,500 hp. at the speed of 130-135 rpm. This engine has eight cylinders with a diameter of 680 m/m and a piston stroke of 1,100 m/m with scavenging pumps directly coupled. Compared with a normal Diesel, this engine has an average pressure of about 4.8 Kg/square centimeter and a piston speed of 5 meters per second. It is possible with such an engine to develop 6400 hp. In the course of the last few years about 25 of such Diesel engines have been completed at the Turin Fiat Diesel Engine Works or under license at Trieste or Genoa destined to the 4,200 ton d.w. ships ordered by the Tirrenia Line for their North Sea service, the last of which was the m/v *Giosue Borsi.*

It should be considered that two of such vessels have been provided with Tosi single acting Diesel engines which at trials on sea have developed 6,200 hp. with the following characteristics:

Cylinders	8
Diameters of cylinders	700 mm.
Piston stroke	1000 mm
Normal power	4000 bhp.
rpm.	115
Speed of pistons	meters/second 4.22
Average effective pressure	kg/cm² 4.62
Power at sea trials	6200 bhp.
rpm.	145
Average pistons speed	meters/second 5.32
Average effective pressure	kg/cm² 5.67

These Tosi Diesel engines are completed with the auxiliaries directly coupled to the main engine (fuel injection pump, scavenging air pump, cylinder lubrication pump, cylinder cooling sea water pump, forced lubrication oil pump, pistons' cooling pump, fuel feeding pump to the injection pump, general service pump, reserve pump for the feeding of the boiler), the main engine auxiliaries as the air compressor, the independent oil pump, three oil depurators and an oil hand pump, and the hull auxiliaries.

In connection with the double acting engines it should be noted that the Stabilmento Grandi Motori Fiat at Turin has standardized this type of engine with a cylinder with a bore of 640

. . . . *And now please turn to page 66* . . . .

HIGH SPEED DIESEL FERRY

By CHARLES F. A. MANN

***Editor's Note:** It is obvious that this preliminary story is not entirely complete as to final detail of arrangement. The plans are subject to constant minor changes and rearrangement as construction gets underway at Seattle. But we believe we have covered the salient features of America's first privately finished-privately built postwar passenger vessel for inland trade.*

THE Puget Sound Navigation Company, the largest ferry operating company on the Pacific coast has done it again. To replace the historic old steam ferry *Iroquois*, one of the most remarkable ships ever built, the company has ordered from the Todd Shipyard Corporation at Seattle a model day-night boat to be completed by the summer of 1947. The new ship will stem from the boards of Gibbs and Cox, the New York Naval Architects who did many of the big war jobs. She will be built to the new, modern, lightweight standards of marine design. Gone is the oldtime camber and sheer. Her lines are straight and clean with no broken decks or other irregular contours. Her length will be 318 ft. overall and her moulded beam will be 53 ft. Her draft, loaded, will be 13 ft. She will carry quite a load too: 100 cars, 220 stateroom passengers, 600 deck passengers, and a crew of 52. Owing to the peculiar circumstances of her intended operations she was designed with an eye for the considerations following: The power plant had to be compact, yet powerful enough to handle widely fluctuating loads and speeds. The hull size and design was governed by the maneuvering room available in Victoria's inner harbor, which is noted for its narrow confines.

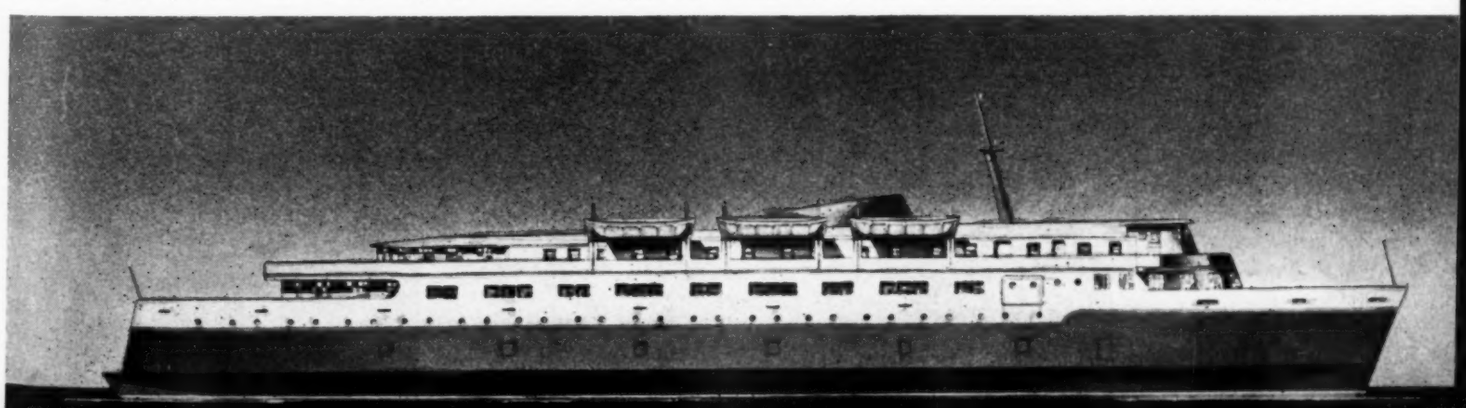
The story of one day's operation of one of these ferries will make clear the requirements for the vessel. The ferry leaves Seattle every night, seven days a week, with a large load of passengers and mail for Port Townsend, Port Angeles and Victoria. It takes about eight hours to make this 100 mile run. In the morning the ferry leaves Victoria for Port Angeles more or less in the capacity of an automobile ferry connecting Vancouver Island with U. S. Highway 101 in Washington, a distance of less than 25 miles. During the winter season the boats cruise at a leisurely 15 knots but during the summer when tourist traffic is great, speeds are increased to 18 knots. This permits an extra trip back to Victoria from Port Angeles every morning during the summer and still allows time for the long trip back to Seattle to pick up passengers and freight for the next round trip.

The new ship will be powered with four General Motors Diesels arranged in sets of two. They are 16 cylinder engines with a bore of 8¾ inches and a stroke of 10½ inches. Each Diesel spins a 525 volt Allis-Chalmers generator which in turn drives a 1500 hp. Westinghouse propulsion motor. The units are arranged in sets of two, each delivering power to a Farrel-Birmingham 2:1 reduction gear at 660 rpm. The total input to the reduction gears is 6000 hp., enough power to insure the 18 knot speed required. Auxiliary power for the ship will be provided by a pair of 8 cylinder, 600 rpm. General Motors Diesels driving 440 volt Westinghouse alternators. Harrison heat exchangers will be installed on each of the six Diesels.

Among the installations planned are electro-hydraulic steering, Radar, and fluorescent lighting. Comfort for passengers and crew will be insured by air conditioning, large living spaces, and excellent sanitary facilities. The Promenade deck features an observation lounge seating about 92 people. This lounge is located well forward with large windows for the passengers to view their passage up the Sound. Aft there is another observation lounge for women. The upper or boat deck is distinguished by a modern-looking pilot house. Aft of the pilot house are the officers' quarters, followed by two rows of deluxe outside staterooms. Then comes the spectacular glass-enclosed dining room, almost circular in shape with a seating capacity of over 100 persons. An ingenious device, known in railroad Pullman circles as the "Combolet" has been adapted for shipboard use. It is a combined folding toilet and washbasin which will be installed in each stateroom. The deluxe staterooms will have this handy combination enclosed in a separate space.

The automobile deck is a marvel of ingenuity. Twin lanes down the middle, on each side of an extremely narrow engine trunk space provide space for trucks, trailers and other heavy vehicles. This space has a 16 foot overhead clearance. Passenger cars are to be carried in two lanes located outboard of the center lanes. The designers, realizing the fact that passenger cars need less headroom allowed seven feet and utilized the other nine feet of 'tween decks space for passenger accommodations. This ingenious use of potentially wasted space permits the existence of the so-called "Cabin Deck" which runs the entire length of the ship on both sides and comprises a series of cabins and a four-foot passageway for access. This feature adds greatly to the passenger carrying capacity of the vessel.

Artists conception of the new 18 knot 6,000 hp. Diesel-driven passenger and automobile ferry which is being built for the Puget Sound operation.



DIESEL VS. STEAM . . . WHAT HA

By T. J. MALONE

WHAT happened in Marshall, Minnesota when Diesel met Steam can be likened to the old Arabian fable about the camel who begged his master to let him warm his cold nose inside his master's tent and once with this nosehold deftly crowded the Arab out into the cold. With Diesel playing the part of the camel that is what occurred in Marshall.

In 1932 Marshall's first Diesel was installed to help carry peak loads and act as a standby for the town's three-engined, steam-electric municipal power plant. This was all of a "nosehold" Diesel needed. There are now 3 Fairbanks Morse Diesels supplying the bulk of the town's electricity.

Of the 8,111,200 kilowatt hours generated last year, the Diesel engines produced 6,216,200 to the steam plant's 1,895,000, a ratio of better than three to one.

Power generation cost by the Diesels for the fiscal year ending March 31, 1946, averaged .66 cent a kilowatt hour; by steam it averaged .99 cent. For the year before, the corresponding costs were .75 cent and .99 cent. While steam cost held its own, Diesel cost last year fell .09 cent per kilowatt hour.

Annual kwh. generation-cost difference, all in favor of Diesel, in the last eight years—the period for which full operating data are available—ranged from a low of .22 cent to a high of .44 cent. They tell the story of the Diesel ascendancy.

The difference of .33 cent a kilowatt hour last year represented a Diesel-over-steam saving of $20,513. Multiply it out—.33 cent by 6,216,200. The difference applied to the steam-produced 1,895,000 kwh. amounts to $6,253, the excess cost, at switchboard, of steam over Diesel.

Since the advent of the Diesel, the steam plant is shut down completely for the two or three months in midsummer and runs at low capacity in two-month periods in spring and fall. The Diesels supply the community's entire energy requirement in midsummer and that part of it in spring and fall over and above the energy produced by the steam plant in supplying exhaust steam for heating.

Before the addition of the Diesels, the steam plant ran the year round, exhausting into the air when heat service was not required. Since that addition, extent of operating the steam plant is determined wholly by the demand for heating, which is during the winter.

The Marshall power plant, as it stands, represents a valuation, without depreciation, of $717,658. This amount covers land, building, heavy machinery, other equipment, electric distribution system and heat mains. The heating system is valued at $64,458.

While early financing was promoted by borrowing, the power plant has now been out of debt for some time. The public is now interested in the amount of its earnings and what is done with them. Receipts from the sale of electricity last year totaled $164,992, of which $69,587 was operating profit, earnings. The average of earnings yearly in the last eight years was $55,054.

Depreciation was deducted in arriving at these profit totals.

The power plant has a surplus of $258,000 in war bonds. Its cash surplus as of March 31, 1946, was $40,258.

When the plant bought its third Fairbanks-Morse Diesel engine, in 1941, it paid most of the cost, $111,667, in cash and the rest within six months, on open account. It has made various permanent transfers from surplus to other city purposes, as, the most recent, $25,000 last year for housing, $71,800 in 1942 for retiring city bonds (airport, etc.) and $5,000 in 1940 toward general city expenses.

When the plant bought its first Diesel engine, late in 1932, it already had three steam engines, an Erie-Ball, a Lentz and a Nordberg, installed respectively in 1918, 1919 and 1927, with a combined alternator capacity of 645 kw. The city had taken over the steam plant from private ownership in 1895. The second Diesel, 8-cylinder, 1400 hp., was installed in 1938 and the third, 10-cylinder, 1750 hp., in 1941. Diesel alternators have a combined rated capacity of 2836 kilowatts. The division is 605—981—1250. With the steam plant's 645, the total capacity is 3,481 kilowatts. Last year's peak load was 2,100 kilowatts as against 1500 kw. for 1945.

Performance of the combined steam-Diesel plant for the last eight fiscal years, April 1 to March 31 inclusive, giving generation costs of steam (S) and Diesel (D) are shown in table "A" on the last page of this article.

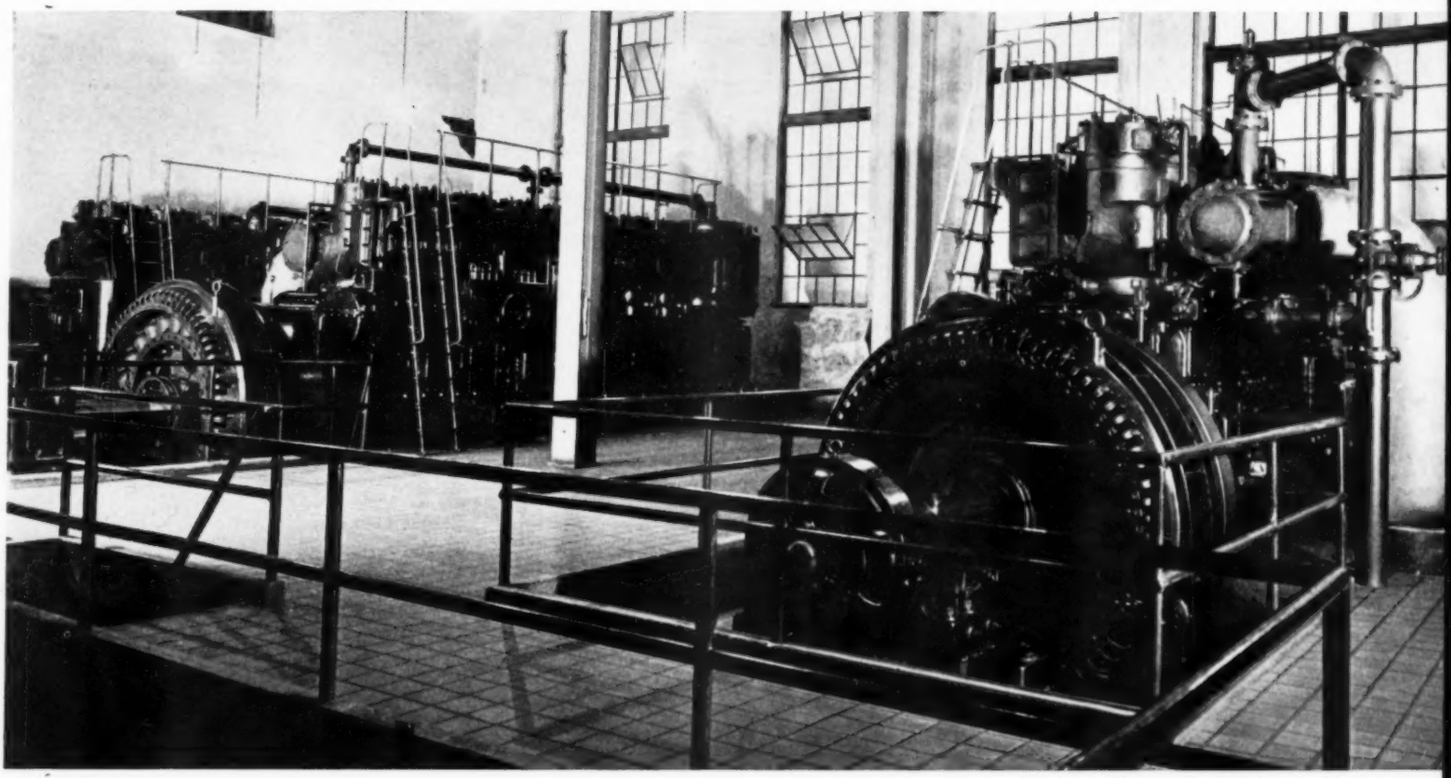
Last year's energy output of the steam plant only, 1,895,000 kilowatt hours, compares with 2,098,700 in the fiscal year, 1932-1933, which was the last year in which no Diesel generation was carried in the audit. The per kwh. cost at switchboard that year was 2.48 cents. In the steam-Diesel plant's first full fiscal year, 1933-1934, the total production was 2,261,100 kwh. and the per kwh. cost at switchboard was 1.27 cents, a saving of 1.21 cents as measured against the steam-only cost of the year before. In 1933-1934, Diesels produced 1,205,000 kwh. and steam 1,045,100.

That saving of 1.21 cents applied to the 2,261,000 represented a year's saving of $27,359, in operating cost. Comparable savings were made through ensuing years in pace with the ever-increasing production of Diesel over steam.

These savings were due to such causes as reduction in the amount of fuel required for the steam engines as result of operating Diesels in the summer months; economy of Diesel opera-

Exterior v which beg in 1932.

HAPPENED IN MARSHALL, MINNESOTA



Interior view of Marshall's Municipal Power Plant showing the three Fairbanks Morse Diesels which drove steam to the wall. Left to right are the 10-cylinder, 1750 hp. unit, the 8-cylinder 1400 hp. unit, and the 5-cylinder, 875 hp. Diesel. All three are Fairbanks-Morse built.

Exterior view of the Marshall, Minnesota plant which began producing Diesel-generated power in 1932.

tion all through the year; economies made by obtaining better boiler efficiency and the quality of operator service.

Of the volume generated last year, a total of 7,239,253 kwh. was sold. Residential use accounted for the largest consumption, 2,516,736 kwh., with commercial light, commercial power and industrial power, lumped, next with 2,251,100 kilowatt hours. An REA cooperative was third with 1,570,300 kwh., or 22.2 per cent of volume sold.

Fourth, with 295,680 kwh., was the village of Russell, population about 500, fifteen miles away, which gets its electricity from the Marshall plant by transmission line. Russell owns the transmission line, distribution system and transformer station.

So-called free services account for a total of 485,980 kilowatt hours. They include city water pumping, 286,142 kwh., street lighting, 147,140, and 52,698 for such municipal services as power and light for municipal buildings, airport, athletic field, two skating rinks, tennis courts, sewage disposal plant and sewage lifts, fire siren and other fire and police alarm systems, and Christmas street decorations. This energy is free in the sense that it is not paid for, the plant absorbing the cost. At 1.26 cents a kilowatt hour, the delivered cost, this means a gift of $6,123. Heat service to public buildings is also free.

A wide range of industries use power, including a meat packing plant, four hatcheries, an egg drying plant, a flax-straw processing plant (making tow), four grain elevators, one of which operates a feed mill, a creamery, two locker plants, two railroad water tanks. A pipe line terminal is being built this year which will operate a pumping station for gasoline, fuel oil and so on.

The present consumer monthly rate schedule

(A) has been in effect since February 15, 1937. It replaced a schedule (B) adopted April 1, 1936. A comparison of charges under them and under the schedule (C) immediately preceding April 1, 1936 follows:

Residential lighting—
(A) 40 kwh. at 6c, 50 at 4c, excess at 2c (minimum $1.00)
(B) 40 kwh. at 6c, 50 at 4c, 50 at 3c, excess 2c
(C) 20 kwh. at 10c, 20 at 7c, excess 3c (minimum $.90)

Commercial lighting—
(A) 75 kwh. at 7c, 75 at 6c, 350 at 5c, excess 3c (Same as B)
(B) 75 kwh. at 7c, 75 at 6c, 350 at 5c, excess 3c
(C) 50 kwh. at 8c, 100 at 7c, 150 at 6c, excess 5c

Power—
(A) 75 kwh. at 6c, 75 at 5c, 350 at 4c, 4,000 at 2.5c, excess 1.5c
(B) Same as C
(C) 200 kwh. at 6c, 200 at 5c, 1,000 at 4c, 7,000 at 2.5c, excess 1.5c

What, no change in rates in ten years? Look at this: a 10 per cent discount for prompt payment is allowed on all except minimum bills!

The current water heating rate is pointed to with pride, $1.50 for a first 250 kwh. For excess the rate is 1 cent. With the 10 per cent discount, this figures out to .54 cent a kilowatt hour for the first 250 kwh., little more than half a cent.

Total number of meters served by the plant is about 2,162. There are 230 electric stoves in the community and 310 water heaters. The heat system has 166 meters, some consumers using more than one meter.

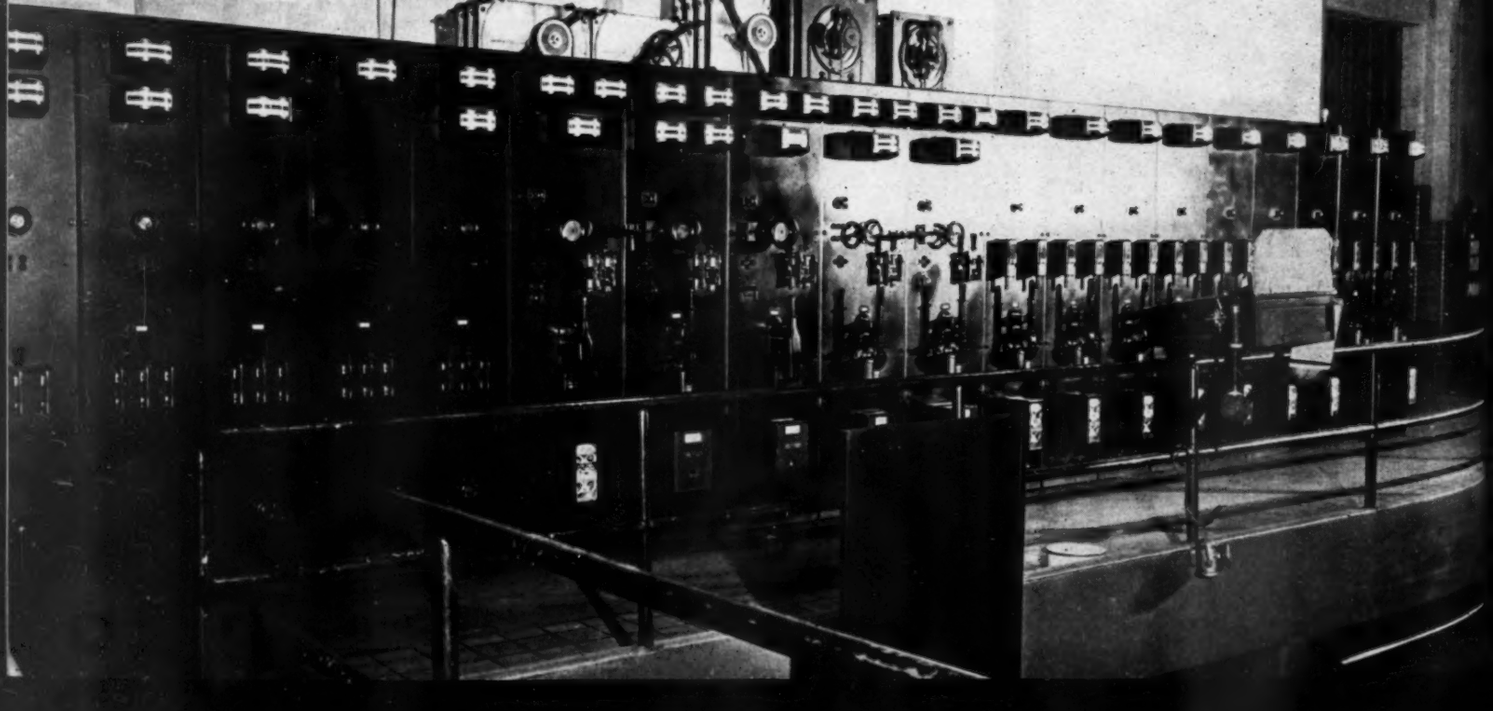
Members of the Marshall Light, Heat and Water Commission are F. D. Jacobson, M. Neisen and O. W. Martin. The first two have served throughout the period of the Diesels, Mr. Martin for six years. Charles E. Healy has been superintendent for the last nine years. Lloyd Benner is engineer, H. N. Harmon, secretary of the commission, is also city clerk.

TABLE "A"—PERFORMANCE RECORD OF MARSHALL PLANT

Year		Kwh. gen. erated	Gen. cost per kwh.	Av. rev. per kwh. sold	Kwh. per gal. of fuel oil	Kw., peak load	Rated kw. cap'y
1938–1939	D	2,339,800	.96c				
	S	1,416,600	1.26				
	TOTAL	3,756,400	1.08	3.08c	10.30	1000	2231
–1940	D	2,964,800	.78				
	S	1,412,600	1.11				
	TOTAL	4,173,400	.89	3.01	11.28	1080	2231
–1941	D	3,357,700	.71				
	S	1,550,000	.93				
	TOTAL	4,907,700	.78	2.68	11.50	1350	2231
–1942	D	4,488,200	.70				
	S	1,439,700	.99				
	TOTAL	5,927,900	.77	2.54	11.91	1600	3481
–1943	D	5,010,200	.73				
	S	1,695,700	1.09				
	TOTAL	6,705,900	.82	2.30	11.84	1300	3481
–1944	D	5,639,500	.74				
	S	1,575,400	1.18				
	TOTAL	7,214,900	.84	2.26	11.90	1400	3481
–1945	D	5,915,600	.75				
	S	1,753,300	.99				
	TOTAL	7,668,900	.80	2.28	12.20	1500	3481
–1946	D	6,216,200	.66				
	S	1,895,000	.99				
	TOTAL	8,111,200	.75	2.27	12.19	2100	3481

Administration and distribution costs per kwh. are treated as the same, steam or Diesel. The available kw. capacity is reduced by 645 kw. in the months when the steam plant is not operating. D—Diesel, S—Steam.

Electric switchboard at the Marshall plant. Eighteen panels in all, it was supplied by the Commonwealth Electric Co. It is equipped with General Electric meters.



INCREASING USE OF DIESELS VERSUS SUPPLY OF DIESEL FUEL

Editor's Note:—Speaking before a meeting of the American Petroleum Institute Coordinating Research Council in Chicago last November, R. H. Morse, Jr., Vice President, Fairbanks, Morse & Co., argued the case for better Diesel fuel and against pricing Diesel users out of the (oil) market. Because of the vital importance of this fuel problem and because of Mr. Morse's eminently constructive contribution to the body of thought on the problem, we herewith pass his remarks along to our 45,000 or more readers, a large majority of whom are directly concerned with the ultimate outcome. We especially direct your attention to Mr. Morse's evaluation of both existing and potential uses of Diesel engines, found in the opening paragraphs below.

WITH sincerity rather than eloquence, I ask you to give heed to the serious problem which confronts us.

The Diesel industry is a customer of the petroleum industry. More specifically, the customers of the Diesel industry are users of a vital natural resource which the petroleum industry chooses to classify in our grandly extravagant American way as a bi-product of gasoline. It is good business to develop and encourage the market for any bi-product, and a few figures may show that the Diesel is becoming, not only a better customer for your petroleum products, but a necessary element as well in our national economy of the future.

In the year 1920, the Diesel engine industry produced 175,000 horsepower. This output, combined with all Diesels built before that date gave a total of better than a million and a quarter horsepower of our engines in operation in the country at the time. In 1936, the industry outpnt was nearly two million horsepower, and the total Diesels in operation were developing nearly nine million horsepower.

By the end of 1944, it is estimated that the country's Diesels were turning up ninety-five million horsepower, and for the year 1945 alone the output of the industry is estimated at nearly thirty million. Since 1920, the use of Diesels has multiplied itself ninety-seven times.

The demand for our most efficient machine for converting oil to useful energy shows little evidence of relaxing. Over the next ten-year period, the natural growth of privately and municipally owned Diesel plants should double the horsepower now in use. We also look for a greater acceptance of Diesels in industry. Strangulations, such as were caused by the recent coal strikes, have taught industry a valuable lesson.

R. H. Morse, Jr.

Except for the very smallest, practically all fishing craft, tug boats, towboats and ferries are now using Diesel engines—and will continue to do so. We hear a lot of wailing on the part of ocean going ship operators about the difficulty of meeting foreign competition. With 64 per cent of the world's shipping propelled by Diesels, perhaps a part of our plight is the fact that only a paltry six per cent of United States shipping is Diesel propelled. With favorable fuel prices and ready availability in all ports, our merchant marine should at least double its use of Diesels in the next ten years.

There is a strong trend toward the Dieselization of trucks and busses, and the surface of this market is hardly scratched. Of the four and a half million motor trucks in the country today, less than one per cent is Diesel driven—in spite of the superiority of the Diesel where hauls are long and grades are stiff. This market alone offers a potential for Diesel engines that is perhaps four times as great as the total Diesel horsepower in use today—and this estimate includes the Diesels used by the armed forces.

As recently as 1925, there were three Diesel locomotives in service in the United States—a total of 1200 horsepower. By the end of 1940, the number of Diesel locomotives had grown to 1,111, and the total horsepower to nearly a million. At the end of 1945, there were 2,864 Diesel locomotives on our railroads, with a grand total horsepower of nearly four million. It is estimated today that the railroads will want—and can absorb—new Diesel locomotives at an average rate of two and a half million horsepower a year. During the next ten years, the railroads expect to add about six times the Diesel motive power now in operation. In other words, we are already a pretty good customer for petroleum products, and we show every promise of becoming an even better one.

Let's consider our present use of lubricating oil. We estimate the Diesels now in use at ninety-seven million horsepower, and the average annual operation of each engine at five thousand hours. This figures to two hundred forty-two and a half million gallons of lubricating oil, and you are selling this oil to us at fifty cents a gallon. From various sources, we have heard that you like to sell us lubricating oil at fifty cents a gallon—that you consider our annual lube bill of a hundred and twenty-one and a quarter million dollars a profitable item of business.

If we are going to buy this lube oil of you, we must have fuel oil in proportion. That proportion figures today to nearly twenty-seven billion gallons, and our fuel bill for the year comes very close to a billion and a half dollars. This seems like a tidy return on the bi-product which we have been buying from you—but now we learn with dismay that you have found a better customer for it.

For the eternal glory of your 1946 income statement, you choose to direct all research and effort toward increasing the amount of high octane gasoline to be squeezed out of each gallon of crude. In your newer processes, the good grades of Diesel fuel and furnace oil are fed to the cat-crackers as charging stock—unless the Diesel users are willing to pay a higher price so that it will be economically attractive for you to sell us this fuel rather than convert it to gasoline.

The petroleum industry suggests to the Diesel

. . . . *And now please turn to page 68* . . . .

POLAR DIAGRAM FOR TUNING OF EXHAUST PIPES

By TROELS WARMING[1]

This paper shows how a simple polar diagram, not requiring any higher mathematics, can be used for calculation of the natural frequency of the exhaust system on a Diesel engine. In general this diagram can be used for determination of all the natural frequencies of any system consisting of gases or fluids in containers of complex form.

CURRENTLY there seems to be an increasing interest in tuning of exhaust pipes on Diesel engines, see for instance a paper by P. H. Schweitzer,[2] and it may therefore be of advantage to have an easy method to determine the natural frequencies of such systems. A polar diagram, similar to the diagram developed some years ago by F. M. Lewis[3] for calculation of crankshaft systems, may be used for this purpose. It will be found, however, that gas systems are much simpler to deal with than shaft systems.

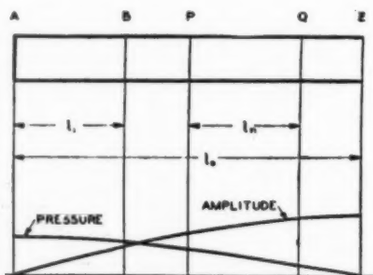


FIG. 1 OSCILLATION IN PIPE OPEN AT ONE END

Consider first the system shown in Fig. 1, consisting of a pipe with constant area and open at one end. The natural frequency of this system is

$$N = \frac{v}{4\,l_0} \cdot 60 = \frac{15\,v}{l_0} \text{ vibrations per min.} \quad [1]$$

where l_0 is the length of the pipe in inches, and v the sound velocity in inches per second. The exhaust from a Diesel engine may with good approximation be considered as atmospheric air for which the sound velocity is

$$v = 585\sqrt{t+460} \text{ in. per sec.} \quad [2]$$

where t is the temperature in degrees F.

When the air in this pipe oscillates, amplitude and pressure at the various points are given by a sine and a cosine curve, Fig. 1. Amplitude and pressure at a point B in the pipe are therefore the co-ordinates for the corresponding point B on the circle shown in Fig. 2, where

$$\text{arc } AB = \frac{l_1}{l_0} \cdot 90 \text{ deg.}$$

The scales used in this polar diagram are of no importance for the determination of natural frequencies since only the relative values are needed. Amplitude and pressure are therefore both measured in inches on the diagram. It is of importance, however, that these scales are not influenced by the area of the pipe.

Consider now length $PQ = l_n$ of the pipe. The corresponding circle are $PQ = \text{arc}_n$ is

$$\text{arc}_n = \frac{l_n}{l_0} \cdot 90 \text{ deg.} \quad [3]$$

Substituting l_0 from Equation [1]

$$\text{arc}_n = \frac{6\,N\,l_n}{v} \text{ deg.} \quad [4]$$

The air particles between P and Q oscillate independently of what takes place in the rest of the pipe, with the exception that at P and Q certain pulsating pressures are supplied and certain volumes of air are pumped in and out. If these pressures and volumes were provided by oscillation at the same frequency but in pipes of different diameter, the oscillations between P and Q would not be affected.

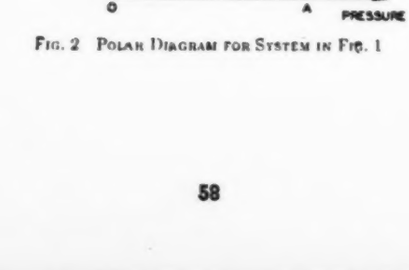


FIG. 2 POLAR DIAGRAM FOR SYSTEM IN FIG. 1

This makes it possible to treat more complicated systems, Figs. 3 and 4. Each length of pipe with constant area will have a corresponding arc of a circle determined by Equation [4]. Where two pipes of different area are connected, the pressure does not change, but the two amplitudes, a_n and a_{n+1}, at the point of connection are inversely proportional to the areas, S_n and S_{n+1}

$$\frac{a_{n+1}}{a_n} = \frac{S_n}{S_{n+1}} \quad [5]$$

It may be added that the condition is different

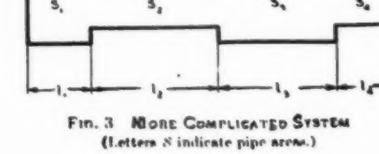


FIG. 3 MORE COMPLICATED SYSTEM
(Letters S indicate pipe areas.)

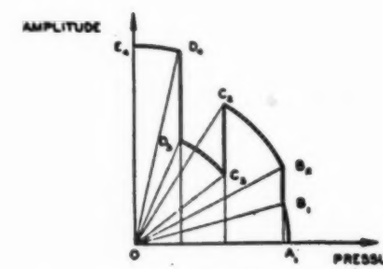


FIG. 4 POLAR DIAGRAM FOR SYSTEM IN FIG. 3

from that of constant flow, in which case the pressure changes where the area changes. This pressure change is necessary to accelerate the air passing to a different velocity. In a vibratory system, as considered here, the air in the whole pipe is accelerated simultaneously, thus not causing any sudden pressure changes at any point in the system.

CONSTRUCTION OF POLAR DIAGRAM

In order to explain the construction of the polar diagram in Fig. 4, it is first assumed that the natural frequency N of the system is known. The first point A_1 of the diagram is chosen arbitrarily on the abscissa axis because it gives the condition at the closed end A of the system

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[1] Assistant Professor of Mechanical Engineering, University of Wisconsin.

[2] "Improving Engine Performance by Exhaust Pipe Tuning," by P. H. Schweitzer, Journal of the American Society of Naval Engineers, vol. 56, May, 1944, p. 185.

[3] "Torsional Vibration in the Diesel Engine," by F. M. Lewis, Trans. Society of Naval Architects and Marine Engineers, vol. 33, 1925, p. 109.

Contributed by the Oil and Gas Power Division and presented at a meeting of the Cleveland Section, Cleveland, Ohio, May, 1945, of The American Society of Mechanical Engineers.

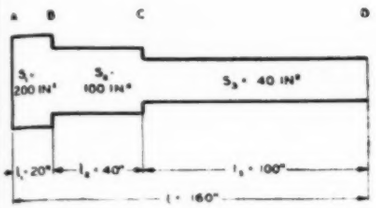


Fig. 5 Exhaust System Calculated in Example

where the amplitude is zero. Point B_1, which gives the condition at the end B of the first pipe, is located on a circle arc through A_1 determined by Equation [4] and with center in point O. Point B_2 gives the condition at the beginning of the second pipe, where the pressure is the same as at B_1, while the amplitude is determined by Equation [5]. Point B_2 is therefore found by simply multiplying the ordinate for B_1, as measured on the diagram, by this proportion. The circle arc B_2C_2 has center in point O and is determined by Equation [4].

The construction is continued through all the steps of the system, but, with atmospheric pressure at the open end, the last point must fall on the ordinate axis. However, if the diagram had been drawn for a frequency different from the natural frequency of the system, the last point would not have fallen on this axis. We have therefore in the polar diagram a method of checking whether a given frequency is the natural frequency.

It is added that the diagram may be drawn just as well by first choosing point E_4 arbitrarily on the ordinate axis and then proceeding the other way through the system. If point A_1 then falls on the abscissa axis, the frequency used was the natural frequency.

So far only the fundamental vibration of the system has been considered, but for higher frequencies the polar diagram, instead of 90 deg., will go through 270 deg., 450 deg., etc. For a system closed at both ends, the diagram will go through 180 deg. (or 360 deg., 540 deg., etc.) thus beginning and ending on the abscissa axis. If the system is open at both ends, the diagram will begin and end on the ordinate axis.

Before calculating the natural frequency of an actual exhaust system, it must be simplified to a system of pipes with constant area, see for instance Figs. 3, 5, or 7. Parts of complicated shape are changed so that they keep the same volume and the same length, the length being measured as the distance the gases flow. Exhaust pots and mufflers are thus considered as short pipes with large area. At the open end

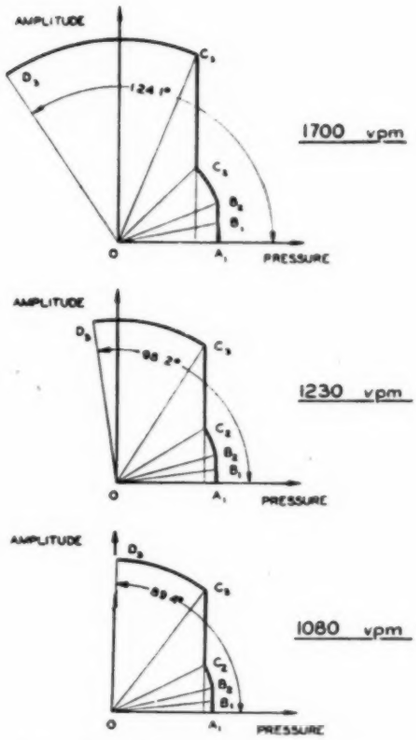


Fig. 6 Polar Diagrams for System in Fig. 5

of a pipe is added a length equal to 0.4 times the pipe diameter in order to provide for the fact that the air particles just outside the pipe take some part in the vibration.

A frequently used exhaust system has a pipe, with constant area S and length l, and some additional volume V, as for instance valves or exhaust pots, near the closed end. If $V/S < l/2$, the system may be calculated as one straight pipe, Fig. 1, of length $l_0 = V/S + l$. The error involved is less than 3 per cent.

Calculating Natural Frequency

As an example, the natural frequency will be calculated of the system shown in Fig. 5, assumed filled with exhaust gas at an average temperature of 500 F. The sound velocity, Equation [2], then is

$$v = 585\ \sqrt{500 + 460} = 18{,}100 \text{ in. per sec.}$$

A rough estimate of the natural frequency is obtained from Equation [1] by considering the system as one straight pipe

$$N = \frac{15v}{l} = \frac{15 \cdot 18{,}100}{160} = 1700 \text{ vibrations per min.}$$

The first polar diagram in Fig. 6 is drawn for this frequency. The angle of the circle arcs, all of which have center in point O, is from Equation [4]

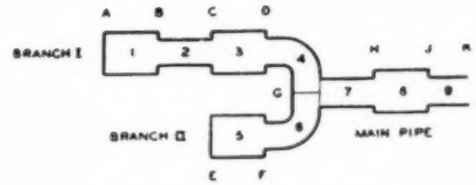


Fig. 7 Branched Exhaust System

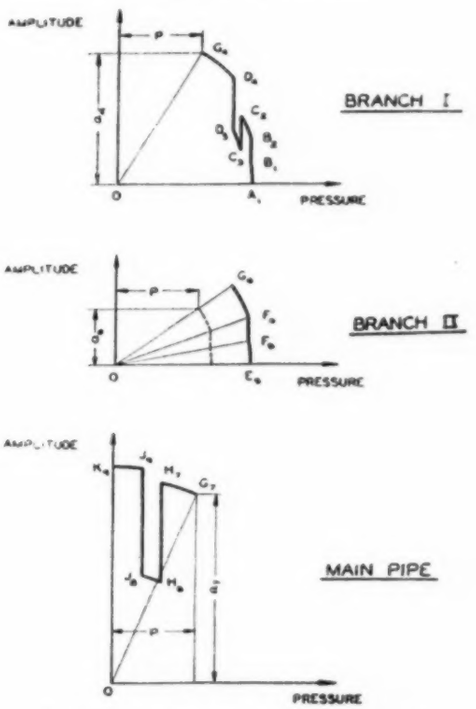


Fig. 8 Polar Diagrams for System in Fig. 7

$$\text{arc}_n = \frac{6Nl_n}{v} = \frac{6 \cdot 1700 \cdot l_n}{18{,}100} = 0.564 \cdot l_n \text{ deg.}$$

where l_n is the corresponding pipe length.

Point A_1 is chosen somewhere on the abscissa axis. Point B_1 is found by

$$\text{arc } A_1B_1 = 0.564 \cdot l_1 = 0.564 \cdot 20 = 11.28 \text{ deg.}$$

Point B_2 is found by multiplying the ordinate for B_1, by

$$\frac{S_1}{S_2} = \frac{200}{100} = 2$$

Point C_2 is found by

$$\text{arc } B_2C_2 = 0.564 \cdot l_2 = 0.564 \cdot 40 = 22.56 \text{ deg.}$$

Point C_3 is found by multiplying the ordinate for C_2 by

$$\frac{S_2}{S_3} = \frac{100}{40} = 2.5$$

Point D_2 is found by

$$\text{arc } C_3D_3 = 0.564 \cdot l_3 = 0.564 \cdot 100 = 56.4 \text{ deg.}$$

The diagram shows that the estimate of 1700 vibrations per min. was too high since the total angle described is 124.1 deg. instead of 90 deg.

. . . . *And now please turn to page 66* . . . .

NEW UNDERWATER EXHAUST SYSTEM

By BRUCE C. SISSON

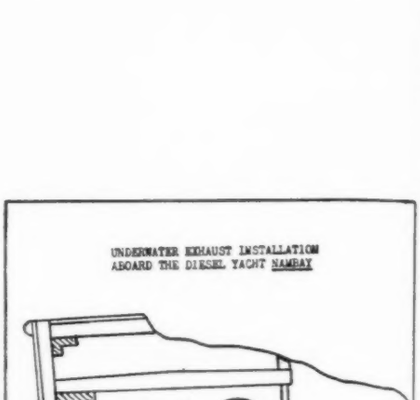
CYRUS McCORMICK'S yacht, the *Nambay* is equipped with the newest in the field of marine design. Perhaps the most outstanding feature of the vessel is her underwater exhaust installation which is designed to give the vessel's passengers complete freedom from exhaust noise and odor. The installation was designed by the Underwater and Atmospheric Silencer Company of New York City and installed by the Julius Peterson yard at Nyack, N. Y. A recent visit with L. W. Scully, one of the partners of the silencer firm, resulted in our gaining some interesting facts about the new installation aboard the *Nambay*.

The idea of an underwater exhaust was developed by F. S. McLachlan more than 10 years ago and was utilized successfully by the armed forces during the war. The particular installation we discussed was that aboard the *Nambay*

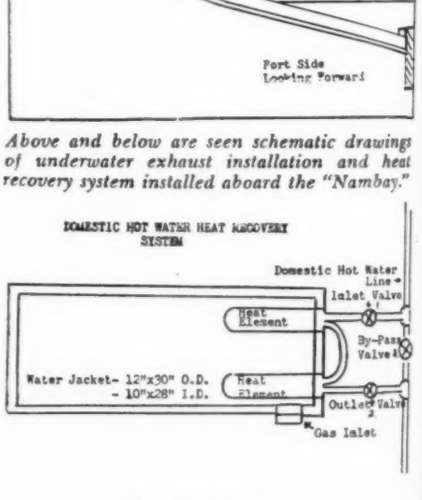
The *Nambay* is an 87-foot Diesel-engined house boat with a speed of about 13 knots. The installation was made for the two 250 bhp. General Motors propulsion Diesels. A wet-type silencer is installed over each engine with water jacketed copper pipe connecting the exhaust manifold to the silencer. A vibration eliminating expansion coupling joins the two. A special type rubber hose from the silencer is led to the impulse injection receiver which tends to damp exhaust pulsations. The exhaust then passes downward to the water line of the yacht through another 8-inch rubber hose and enters a discharge sump, specially designed for the installation. From there the exhaust passes through the hull into the underwater eductor. This eductor is the key to the success of the whole installation. It is a streamlined fitting set in the hull just over the bilge keel of the vessel. The exhaust enters this eductor and passes aft into the water through the aft end of the eductor when the vessel is moving forward. When the vessel is reversing, this after opening is forced shut by an automatic flapper valve which prevents back water from being forced back through the eductor into the exhaust system. The exhaust then passes through a set of openings in the eductor made specially for the purpose. The effectiveness of the system was amply demonstrated in the test results made during the vessel's trial run. Back pressure tests revealed that standing still at the dock the pressure was .6 lbs. while at 1310 engine rpm. underway the pressure rose to 1 lb. Moreover the exhaust temperatures of the engines during underway tests were 150° lower than those recorded on the engines during the block tests. The back pressure tests proved very satisfactory since the engine company had specified that the back pressure on the exhaust system should not exceed 1½ lbs.

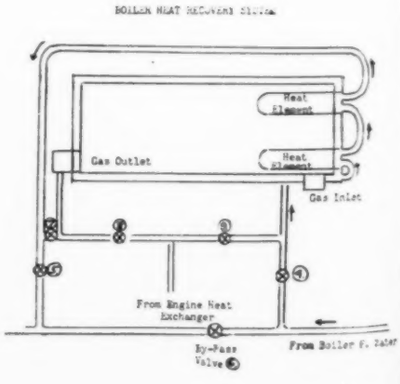
As well as specifying an underwater exhaust system for the *Nambay*, the owner specified that a heat recovery system be installed for the 4 cylinder 7½ kw. DC Diesel generator to supply 95° boiler feed water and heat the domestic hot water for the vessel. Scully and McLachlan went right to work on this problem and devised a very effective system as is shown on this page. By utilizing a water jacketed heat recovery silencer with four heating elements installed, they devised a system that would cover any predictable set of operating conditions. For domestic hot water heating 2 heating units are arranged in series. This system is easily controlled by three valves. For preheating boiler water two other heating units were installed with independent piping. By installing an additional valve connecting the domestic and boiler feed water systems it is possible to heat salt water for the domestic system for shower use. Salt water cooling for the jacket is supplied from the engine heat exchanger when the domestic and boiler feed systems are inoperative.

The effect of such a system is such that the constantly operating auxiliary generator is a steady source of heat for the vessel's water system and reduces the operational time of the heating boiler, thus saving considerable fuel. Mr. Scully and Mr. McLachlan should be congratulated on these new developments which should prove increasingly popular among today's yachtsmen.



Above and below are seen schematic drawings of underwater exhaust installation and heat recovery system installed aboard the "Nambay."





RECONVERSION OF THE *POELAU LAUT*

By F. A. W. STIEFLER*

THE M/S *Poelau Laut* is the only survivor of three sister ships in the Poelau group, the other two—the M/S *Poelau Tello* and *Poelau Bras*—having been lost by torpedo action in the war. The name Poelau Laut means Sea Island, a small island of the Dutch East Indies.

The vessel was built in 1928 in Amsterdam, and until the time of the war was engaged in passenger, mail, and freight trade between Amsterdam and Batavia for the Netherlands Line. With the outset of the war all Dutch shipping came under the protective wing of the British Admiralty, and the *Poelau Laut* was leased to the War Shipping Administration to be used as a troop carrier.

After conversion she had a capacity for 2500 troops. These were housed in the upper cargo holds where temporary facilities had been installed. The remaining portions of her holds still had a capacity for approximately 5,000 tons of troop gear or general cargo.

Her extreme length is 517 feet, her breadth 61 feet, and she is 36 feet 9 inches in depth to the upper deck. Classified as a 12,000 ton vessel, she is powered by an 8,000 hp. Sulzer Brothers Diesel built at Winterthur, Switzerland. This is the third largest Diesel afloat, each of her 8 cylinders imparting a push of 1,000 hp. at each stroke. At full speed operation the engine turns over approximately 95 rpm. and drives the vessel at about 16 knots. She has an 8,000 barrel oil capacity with a consumption of 126 barrels per day (approximately 300 miles). She has accommodations for approximately 60 passengers in beautifully paneled cabins. Her smoking salon is paneled in carved gum and red marble.

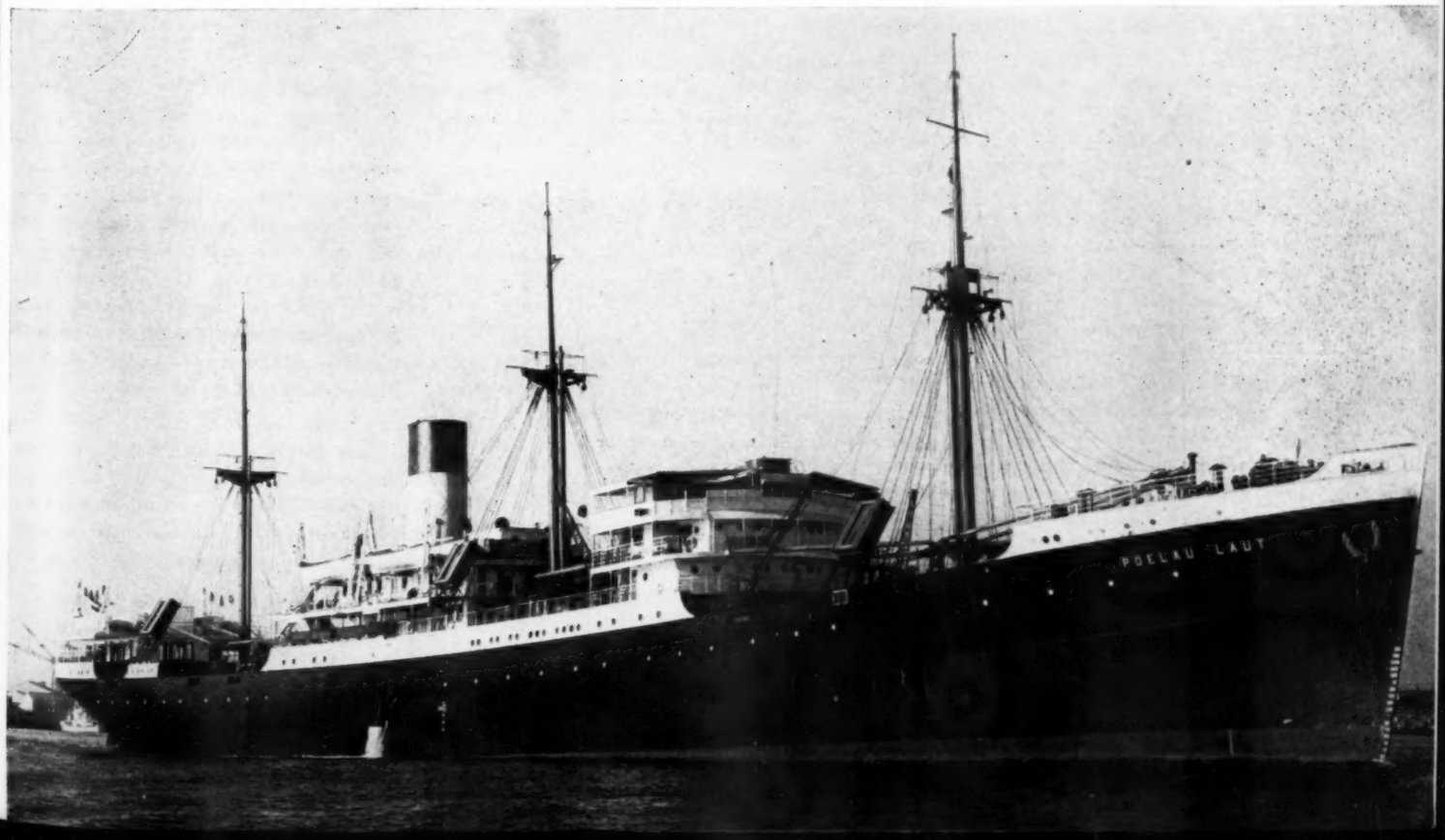
Before being returned to her owners, the Amsterdam-Batavia Lines, she was reconditioned in the San Pedro Yard of Bethlehem Steel Company's Shipbuilding Division at the request of the War Shipping Administration. This reconversion proved to be rather extensive and provided West Coast ship repairmen with one of the biggest engine jobs that has ever been performed on the Pacific Coast. Investigation showed that the long months of continuous operation with little or no time for what should have been interim repairs had so damaged and worn the great crankshaft of the engine that it was necessary that it be replaced, as well as a general rebuilding of the entire engine and auxiliaries.

A spare half crankshaft which had been in Amsterdam throughout the war and the German occupation was discovered to be intact and was shipped to San Pedro for installation. A second half of the 92 ton shaft was rebuilt using the integrated facilities of Bethlehem's San Pedro and San Francisco Yards. From a huge forging approximately 25 in. in diameter new crankpins were turned and fitted into the webs of the old shafts and the whole realigned and machined to new shaft specifications. This half shaft was then returned to San Pedro for final alignment, installation, and fitting of new bearings.

The engine work, however, was not all that was required in the way of extreme skills and arts in the reconversion of this vessel. Cabins once beautifully paneled and varnished had been scarred and beaten by the traffic of many men; the installation of troop quarters and accommodations had left their mark; and it was necessary that this woodwork and paneling be returned to its original state. To do this required men of a caliber almost extinct today. Here again Bethlehem's versatility and resources provided skilled cabinet makers and finishers to restore this delicate woodwork to its original beauty, even to the extent of reproducing a couple of articles of beautifully carved furniture which had been damaged beyond repair.

* *Bethlehem Pacific Coast Steel Corporation.*

Powered by an 8000 hp. Sulzer Diesel, the "Poelau Laut" has just completed her reconversion at Bethlehem's West Coast yard. She has the third largest marine Diesel installation in the world.



STANDARD PRACTICES FOR DIESEL ENGINES

CHAPTER THREE

Editor's Note: The following article is a reprint of the third chapter of the newly revised book "Standard Practices for Low and Medium Speed Stationary Diesel Engines" which was recently published by the Diesel Engine Manufacturers Association. Other chapters of the book will be reprinted in succeeding issues of DIESEL PROGRESS. In answer to a growing demand for the revision of the 1935 edition, this book was published. It includes the refinements, new developments and changing procedures that have marked the advances of Diesel engineering in the past ten years. The aim of this book is to be of service to Diesel engine users, prospective buyers and consulting engineers. It covers stationary Diesel engines operating at speeds up to and including 750 rpm. The book is available to readers of DIESEL PROGRESS at the price of $2.75 postpaid. Order your copy today from DIESEL PROGRESS, 2 West 45th St., New York 19, N. Y.

DIESEL engine builders of this country have been, and still are most active in carrying on intensive engineering development programs. All of these programs nave not been conducted along the same lines. The different methods of engineering approach, productive of this variety, present no real inconsistency, since all have brought about the same result—a modern unit of high economy and reliability.

Any limitation in specifications to exclude one or more standard makes of Diesel engines because of variations from a specific type, only places the prospective buyer at a disadvantage by limiting his choice. The shrewdest buying strategy specifies only the requirements to be met because of the plant conditions, and requires the bidder to submit detailed specifications covering tne engine or engines and the accessories offered. The suggested specifications in Chapter Seventeen take such a method into account by presenting blank forms to be filled out by bidders. The form for engine information on page 143 is suggested as covering all data essential for purposes of comparison.

No specification or tabulation can eliminate the need for the exercise of experienced judgment in the selection of the best bid. Long and involved tabulations of heterogeneous items about engine construction are in themselves confessions of a lack of ability to select the best offer on its real merits.

There is more than one acceptable treatment of design for a modern Diesel engine. Some manufacturers build engines of two-cycle type, others of four-cycle type, and some make engines of both types concurrently. Both types of Diesel engines have attained a high level of performance and economy. There are many other different treatments of design which produce equivalent results. Some of these will be discusesd in this chapter.

Attached Pumps.—Some engines, usually the smaller ones, have circulating water pumps built-in (that is, mounted on the engine itself and driven from the engine by gear or chain drive). Larger engines usually are designed without built-in water pumps and, therefore, require the installation of motor-driven pumps. Some two-cycle engines are constructed with built-in scavenging pumps or blowers, others require the use of motor-driven equipment.

Flywheel.—The dimensions and weights of flywheels of Diesel engines cannot be determined accurately until the equipment to be driven is first selected, and the necessary engineering data pertaining to the driven equipment are analyzed and evaluated with respect to parallel operation of alternating current generators and torsional vibration. (See Chapter Five on "Torsional Vibrations and Critical Speeds").

Diesel engine flywheels may be one- or two-piece construction and must have suitable flywheel effect for the purpose intended. Some types of engines require very little flywheel effect, and this may be incorporated in the generator rotor. Generators with weighted rotors are specified as flywheel type, or weighted rotor type, as distinguished from standard engine type, but both types as offered by reputable generator manufacturers are of essentially the same design.

Specifications should be so written as to permit the Diesel engine builder to select the type and weight of flywheel for his engine as intended for a given service, or to omit the flywheel if the WR^2 of the driven equipment is sufficient to produce the necessary flywheel effect.

Engine Extension Shafts.—The length and diameter of extension shafts of Diesel engines vary with the type and speed of the engines, the type of generator or other driven equipment, and the critical speed or torsional vibration conditions indicated by calculations after the necessary data covering the driven equipment have been assembled and analyzed. Torsional vibration conditions may require the shifting of the generator or other directly mounted and driven equipment toward the flywheel or the outboard bearing. Under certain conditions it may be necessary to make a slight change in the diameter of the extension shaft to provide a smoothly running unit. Flywheel type generators usually are mounted on short extension shafts, whereas standard engine type generators require longer extension shafts. The exact dimensions of the extension shaft, therefore, cannot be determined until after the driven equipment is selected and the necessary engineering data analyzed.

Flywheel Barring Device.—Flywheel barring devices are required for rotating a Diesel engine to its starting position or for adjustment and repair purposes. There are three types of barring devices used—manually operated, pneumatically operated, and electrically driven. The first two types named are generally furnished by Diesel engine builders. The use of barring devices is so infrequent that the furnishing of unusually expensive apparatus is not warranted.

Diesel engines up to about 750 hp are generally furnished with manually operated flywheel barring devices. Pneumatically operated gear is used with sizes that would require two men to rotate the engine if a manually operated device were used. Pneumatic devices are actuated by air under pressure from the starting air tanks and must be connected through piping to these tanks. The Diesel engine builder may be relied upon to furnish flywheel barring mechanism of proper type.

The electrically operated flywheel barring device is not generally furnished as standard equipment. In the larger sized engines where its use is justified, manufacturers sometimes furnish it as optional equipment.

. . . . *And now please turn to page 70* . . . .

Exchange Your Diesel Maintenance Ideas

Conducted by R. L. GREGORY

Editor's Note: In this department we provide a meeting place where Diesel and Gas engine operators may exchange mutually helpful maintenance experiences to keep our engines in top condition. Mr. Gregory edits your material and adds constructive suggestions from his own wide experience. This is your department—mail your contributions direct to DIESEL PROGRESS.

"Method of Assembling Needle Roller Type of Piston Pin Bearing"

THE following contribution was sent in by our good friend L. I. Laurent of the New Roads, Louisiana, Municipal plant. In sending this contribution in, Mr. Laurent attached a personal letter to the writer, in which he said in part, quote: "We look forward to these articles in DIESEL PROGRESS, and your letter came just as we were starting our annual inspection of our units. I am enclosing another little contribution which you may be able to pass on to the readers of DIESEL PROGRESS.

There are several methods of installing and assembling these pin bearings, but the usual way of assembling a bearing of this type, is to place each row of needles, with retainer rings between each row, on a piston pin sleeve provided for that purpose. This sleeve is coated with cup grease and the rows held in place with heavy rubber bands. The rubber bands are removed as each row of needles is slipped into the piston pin bushing.

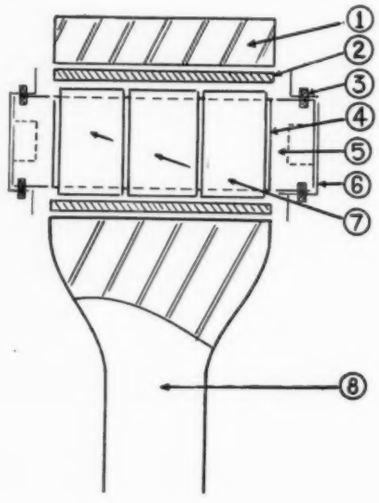
Another method which we conceived during the war, when it was almost impossible to secure these heavy rubber bands and we have found it most satisfactory. The procedure is as follows: Place one retainer ring inside the piston pin bushing, which bushing has already been set in the connecting rod. The distance of the retainer ring from the outer edge of the bushing should be about the length of a needle roller. With one hand, hold the piston pin sleeve about level through the bushing and retainer, and with the other hand insert the needles into the space between the sleeve and bushing.

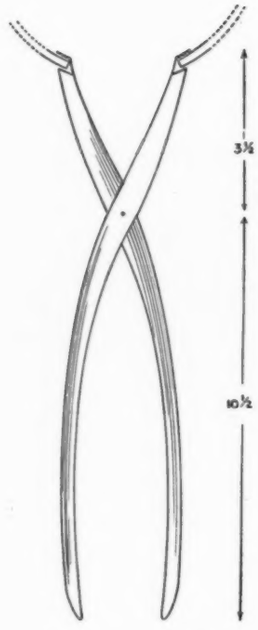
When all the needles for the first row are in position, install another retainer ring and slide the whole row about midway inside the bushing, using a blunt end tool such as a screwdriver or some similar tool. Install the two outer rows and retainers in the same manner, then tighten the sleeve screws for holding the assembled bearing in place.

If desired, oil may be applied while assembling, but be sure that the same number of needle rollers is used to make up each row. Either method of assembly is good, but we have found this latter method, easier, quicker and neater as you do not have to contend with either grease or rubber bands.

Mr. Laurent has sent in several good suggestions on maintenance problems and these are the sort of ideas we like to receive from our readers. Many of us have found as Mr. Laurent has, that it is often to our advantage to constrive some original methods in keeping up certain maintenance work, and if any of our readers have any ideas of this type, send them in, the editors of DIESEL PROGRESS will compensate you for them.

Needle Roller Type Piston Pin Bearing: 1. and 8. Connecting Rod; 2. Piston Pin Bushing; 3. Set Screw; 4. Retainer Ring; 5 Sleeve; 6. Piston; 7. Needle Bearings.





Piston Ring Tongs

Piston Ring Removal

The usual procedure for removing and replacing piston rings is at best a ticklish job with always the danger of breaking them in the process. One suggestion, submitted by M. W. Monson, Superintendent of the Fosston Municipal Light and Power Plant, Fosston, Minnesota, cites the solution which his plant found for this problem. They manufactured a set of tongs such as are seen in the accompanying illustration which were designed specifically for their Diesel pistons. With this handy tool the ring can be easily spread to permit its insertion or removal without putting undue stress on the somewhat brittle piston rings. The use of tongs eliminates most of the rough handling which rings sometimes undergo. As Mr. Monson says, it is necessary to have a separate set of tongs for each size piston but the simplicity of construction of the tongs makes it easy to duplicate them for various piston sizes. The tongs used at the Fosston plant are 14 inches long, with a length from end jaw to pin of 3½ inches and a handle length of 11½ inches.

Italian Marine—

continued from page 52

m/m and a piston stroke of 1,160 m/m which develops 850 hp. in normal service and a maximum trial run of 1300 hp. Fiat has built five, six, seven and nine cylinder engines developing 4200 to 9600 hp. It is this type Diesel that will be installed on the cargo and passenger liner *Ferruccio Buonapace* recently launched from the Ansaldo yard at Genova Sestri. In these engines there are two fuel pumps for each cylinder, one at each end. The fuel pumps are located forward on the engine and are directly driven by a shaft. Most of the engines have been built by Fiat with independently controlled service pumps with exception to those employed in motor tankers. In the course of the last few years the Stabilimento Grandi Motori Fiat has built 37 Diesel engines of such type with cylinders varying from 5 to 7 in addition to 9 nine cylinder engines built under license by the Fabbrica Macchine Sant'Andrea, and some of them are still to be placed on the vessels as these have not been completed.

It is evident from the above that the Italian Diesel marine engineering industry has an output capacity of about 100/150 complete Diesel propelling sets a year with a total power output of 400,000 hp. which means that it exceeds the yearly requirements of the country whose shipbuilding industry, although it should turn out 150,000 tons d.w. yearly, cannot utilize all the Diesels produced.

Polar Diagram—

continued from page 59

A second estimate is therefore made

$$N = \frac{90}{124.1} \cdot 1700 = 1230 \text{ vibrations per min.}$$

For this frequency a new polar diagram is constructed with the angle of the circle arcs

$$\text{arc}_n = \frac{6 \cdot 1230 \cdot l_n}{18{,}100} = 0.407 \cdot l_n \text{ deg.}$$

The procedure is the same as before and the result this time is a total described angle of 98.2 deg.

By extrapolation from the first two estimates is found

$$N = 1230 - \frac{1700 - 1230}{124.1 - 98.2}(98.2 - 90) = 1080 \text{ vibrations per min.}$$

A polar diagram for this frequency has a total described angle of 89.4 deg. which is quite close to 90 deg. However, by interpolation between the last two tries will be found

$$N = 1080 + \frac{1230 - 1080}{98.2 - 89.4}(90 - 89.4) = 1090 \text{ vibrations per min.}$$

which is the natural frequency of the system with good accuracy.

During the construction of the polar diagram, difficulties may arise with points falling either outside the paper or too close to the center to give an accurate construction. The following rule will then be helpful: Any point in the diagram may be moved on a radius, closer to or away from the center, and the construction may then be continued from the new location.

Branched Systems

Branched systems need a separate polar diagram for each branch and for the main pipe, all diagrams using the same frequency, Figs. 7 and 8. The diagrams for the branches are begun at the end of the branch and worked toward the junction. At this point the pressure p must be the same in both branches so the diagram for one of them, in this case branch II, is reduced accordingly. The diagram for the main pipe now can be drawn beginning at the junction point. The pressure p must be the same as in the branches, and the amplitude a_7 is determined by

$$a_7 \cdot S_7 = a_4 \cdot S_4 + a_6 \cdot S_6$$

where a_4, a_6 and a_7 are measured in inches on the diagram, and S_4, S_6, and S_7 are pipe areas. The diagram is then completed and, if the last point falls on the ordinate axis, we have the natural frequency of the branched system.

Motor Boat Show Leaders To Call Safety Conference January 16

A MOTOR boat safety conference will be held on Thursday, January 16, during the 1947 National Motor Boat Show, Ira Hand, show manager, announced recently. The gathering will be the first meeting on this important subject since the memorable conference held during the 1940 show.

The safety forum, scheduled for a full morning session, will be held at the Shelton Hotel. Chairman of the meeting will be Alfred E. Luders, president of the Luders Marine Construction Company of Stamford, Conn., who heads the Technical Committee of the National Association of Engine and Boat Manufacturers, and also is chairman of the Motor Craft Committee of the National Fire Protection Ass'n.

Representatives of marine insuring companies, marine engine manufacturers, boat builders and equipment produrers have been invited to participate in this important meeting. A thorough discussion of safety measures and regulations in recreational boat construction and equipment is assured at the conference.

Government authorities and boating associations are doing a fine job of education in study of navigation, use of equipment and training of personnel. At the coming safety conference the subjects of handling the problems of bilge ventilation, fuel and carburetor care, galley equipment, heating, and electrical installations will be stressed.

First All-Diesel Rail Line

THE East Carolina Railway Company, which operates between Goldsboro and Morehead City, N. C., expects in the near future to become the first railroad in the United States operated entirely with diesel engines, according to H. P. Edwards of New Bern, N. C., chairman of the board.

The line now has four Diesel locomotives and expects to obtain another one soon to replace the only coal-burning locomotive still in operation. The board has just approved a resolution asking the Interstate Commerce Commission for permission to borrow the $70,000 needed for the purchase of the new Diesel.

Increasing Use of Diesels—

. . . . *Continued from page 57* . . . .

industry that we redesign our engines in such a manner that they will operate successfully on the new bi-products of the new processes of gasoline manufacture. We built our industry to use your old bi-products, and perhaps we can rebuild it to use your new ones. In any event, we are trying to do so with all available research and speed—but this is little consolation to the users of the hungry ninety-seven million horsepower of Diesel engines already in existence who see their vital fuel supply being priced out of their reach.

The world has become Diesel conscious because of the economy of this engine. We figure the billion and a half dollar annual fuel bill of American Diesels in fractions of a penny, because the performance of the Diesel is predictably consistent to the point where a fraction of a penny can mean the difference between profit and loss in efficiently run industry, commerce or utility. Power competition is keen, the Diesel has won its foothold honestly, price fluctuation in Diesel fuels will invite chaos.

The new substitute which you ask us to use in place of our accustomed fuel has poor ignition qualities and other undesirable features. The automotive high speed Diesel is highly sensitive to the quality of its fuel. If the worst is true, automotive Diesel users may be compelled to pay the higher price for the fuel they are now receiving—and like it.

The larger Diesels can survive on a poorer fuel —if this is the alternative, but we ask you sincerely to turn your great research facilities toward giving us for these engines an adequate supply of the best possible fuel—at a price that the national economy can afford to pay. Remember, too, these big engines are one of your good lube oil markets.

You may accuse us of selfishness and poor logic when we ask you to supply us with a product which you can sell to a luxury market at a higher price than we can afford to pay. It is hardly selfish to plead the cause of the most efficient user of a dwindling national resource, when evidence shows that this precious commodity is being squandered lavishly by other of its consumers.

You are taking oil out of the soil of the United States. What is wasted this year can not be replaced in this civilization. You are marketing your shrinking heritage in such a way as to

bring the greatest immediate return to yourselves.

There are two kinds of household burners for heating—the pot type and the gun type. The latter can use a lower grade of fuel, but the typical oil salesman can not anticipate, without a little effort at least, what kind of burner he will encounter—so he services both types with top grade fuel. This is waste.

Certain of our railroads operate oil burning steam locomotives. If the oil these railroads burn was converted to Diesel fuel and burned in Diesel locomotives, this much oil would run all the railroads in the country—at a far greater profit than they are now showing. This is criminal waste.

We have just won a war. We almost lost it. We were fighting two enemies far inferior to us in manpower and in national resources. Their strength lay in their national economy, their realization that they must utilize to the full all of the resources at their command. Before the war, we chose to laugh at this type of economy, and pass it off as something beneath our standard of living. During the war, we fought by skimming the cream from the top of our manpower—and from the top of everything else. This was our way of fighting because it was our way of living.

Aviation fuel is an example. You did a magnificent technological job of developing a super gasoline. To make it, you used only the best of the best of the best—and a lot of it. Germany countered with a jet plane which would outfly ours—and it burned kerosene. This is not said to belittle our effort, our scientists or our research. It is just an example of the difference between the German and the American way of doing things. And we did win the war.

With any war behind us, we are just that much poorer in unexploited wealth, and if we continue to live—as it seems that we are doing—by our old slap-happy philosophies of eternal abundance, we are going to be just that much more vulnerable when the next war comes along. The closer that we as a nation can come to getting the last penny's worth out of our natural resources—regardless of what may be the profit today—the longer we as a nation can survive.

The Diesel engine is the most efficient instrument in existence which will convert petroleum into useful energy. It is an ever growing aid

. . . . *And now please turn to page 70* . . . .

in today's economy, and it is a vital necessity to the economy which we must inevitably face in our future. We ask you to recognize the importance of the Diesel in any stable picture of future national prosperity and security. We ask you to apply to our problems and our needs of today the full brilliance of your vast research facilities. We ask you to realize that the Diesel runs on oil—and that it must be kept running.

Standard Practices—

. . . . *Continued from page 62* . . . .

Bed Plates.—When engine-generator sets are to be mounted on concrete foundations, it is not the general practice to use an extension of the engine base or separate sub-base to support the generator, exciter and outboard bearing.

Engine Platforms.—The difference in engine design (that is, height of controls from floor level, accessibility of parts for removal or adjustment) is responsible for a variety of Diesel engine platform arrangements. Some types and sizes of engines do not require platforms on both sides, whereas others would not be sufficiently accessible without them. It is, therefore, well to leave such details to the engine builder. Where two or more engines are installed, the buyer may wish interconnecting runways between platforms. These can be furnished as extras by the engine builder. The buyer's drawings in such cases should show the exact locations of all engines and interconnecting runways with any additional ladders desired, as well as any supports to be made available by the buyer for these runways.

Right- and Left-Hand Engines.—Specifications covering plants to contain two engines sometimes call for one of these to be right-hand, the other left-hand. Such a specification means that the engine flywheels are to be on the right- and left-hand sides respectively, when viewing the engines from the operating sides. The thought here is that engines will be easier to attend if the controls are located on either side of the aisle between the units. There may have been a reason for such an arrangement years ago before the days of remote governor control, but with the common use of such control and the very little attention needed by engines when running, it is a useless requirement. Such a specification requires one of the engines to be non-standard, with the loss of interchangeability that this means. In any case, any fancied advantage is lost if and when a third unit is installed.

Wrenches and Tools.—It is usual practice to include in standard equipment all necessary special wrenches and tools required for a spe-

cific engine but not to furnish any wrenches or tools that can be purchased readily on the open market. Most power plants have all necessary standard wrenches and tools for general purposes, and duplication would be superfluous. Duplications of special wrenches are not necessary if two or more similar engines are installed. The list of special wrenches and tools for Diesel engines varies with the type and size of the engine. No detailed specification of a standard list can be made.

Wrench boards are not usually furnished as standard equipment. In cases where specifications call for a wrench board, the consulting engineer should show the type, dimensions, materials of construction and finish, in order that bids may be requested of manufacturers of such equipment. In general it is much more desirable to have wrench boards made in local carpentry shops after the full complement of wrenches and tools has been selected and the most suitable location of the wrench board has been determined.

Engine Spare Parts.—Spare parts included in the list of standard equipment of Diesel engines necessarily vary with the type of engines specified; consequently a standard list of spares cannot properly be specified. Diesel engine builders' specifications should list in detail the spare parts included as standard equipment. In cases where such a detailed list does not accompany the proposal or specifications, the consulting engineer or buyer should specify that a complete list of spare parts be designated

General.—Whatever a builder's standard practice may be in regard to any alternative constructions, he is able to manufacture most efficiently and at the lowest cost only when following his standard. Deviations from such standards as may be forced by rigid purchase specifications, result in higher bids on equipment no better than standard—sometimes not as good as standard.

It is an important point that each builder design his engine to be a harmonious whole. Any requirement which attempts to force him to change some detail in order to conform to a competitive design which has captured the buyer's fancy may upset the harmony of design which, taken as an overall matter, may be quite equal in merit to the favored type. The detailed design of a Diesel engine is something on which the builder stakes his entire reputation and business future. It is based upon much experience and continued study by specialists into new standards and construction.

Two Falk Appointments Announced

L. H. Billings *B. C. Bugbee, Jr.*

MR. L. H. BILLINGS has been appointed District Manager of a newly created Falk Corporation sales territory, it was announced recently by Mr. Walter L. Schneider, Vice President and Director of Sales. Formerly Production Manager at Falk, Billings directs sales in Wisconsin, Upper Michigan and parts of Iowa.

Shortly following Billings' promotion, came the announcement from Mr. Harold F. Falk, Works Manager, that Mr. B. C. Bugbee had been named Production Control Manager

Nordberg Appoints Export Manager

B. T. Eagerton

NORDBERG Manufacturing Company recently announced the appointment of B. T. Eagerton as Export Manager. He has been associated with exporting since 1928 and came to Nordberg from the Oliver Corporation where he served as Assistant Manager of the Export Division. Prior to that he was Export Manager for the Cleveland Tractor Company which was later absorbed by the Oliver Corporation. During his many years in export work he traveled extensively and has wide acquaintance in export markets. His headquarters will be at the main office of Nordberg at Milwaukee.

Oakite Appoints J. C. Leonard

J. C. Leonard

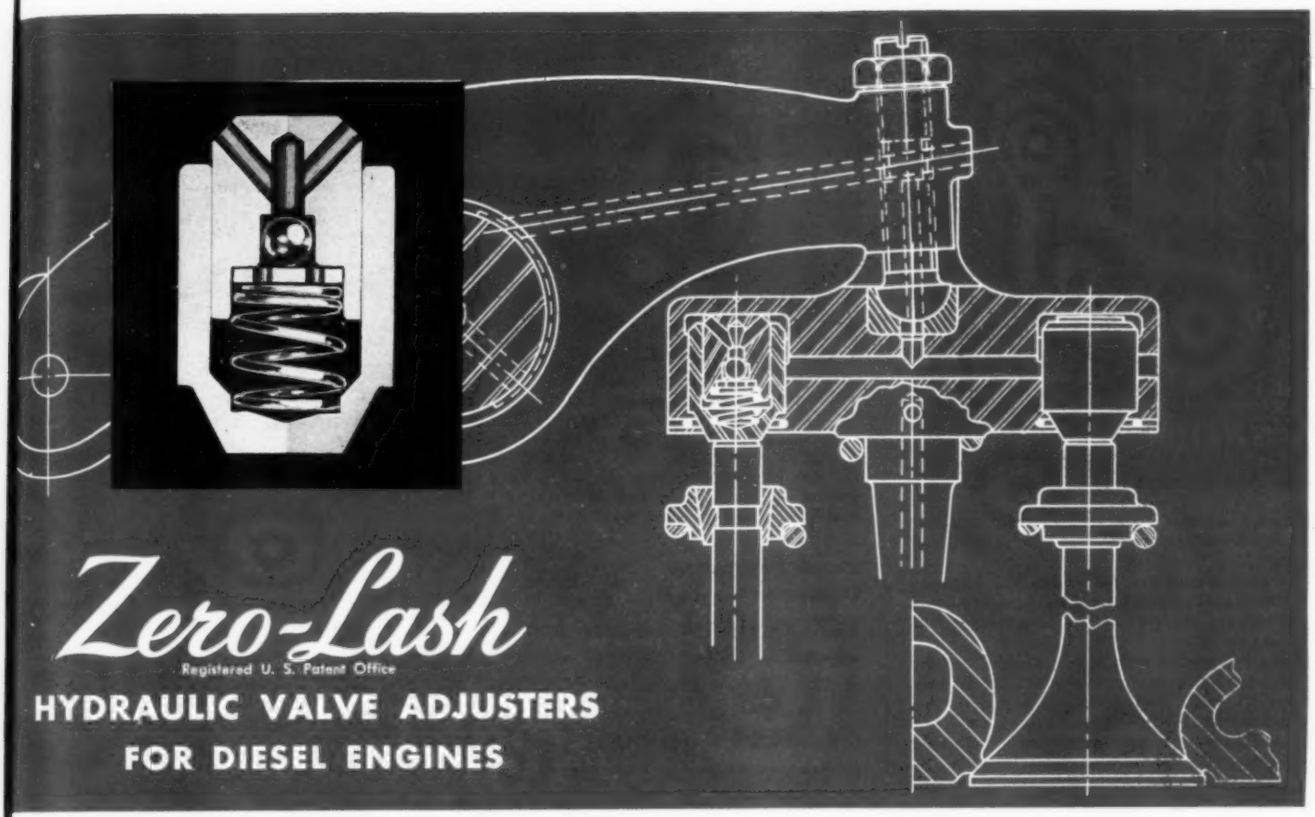
ANNOUNCEMENT is made by Oakite Products, Inc., of the appointment of J. C. Leonard as Sales Manager of its Industrial Marketing Division. Associated with the Oakite organization in the servicing of its specialized cleaning materials and equipment for over 22 years, the last 16 years of which was in the capacity of Manager of the company's Chicago Division, Mr. Leonard assumed his new duties on September 1, 1946. He will direct the marketing and servicing activities of Oakite's industrial field staff from the general offices of the company in New York.

Caterpillar Plant Open to Visitors

RESTRICTED during war years, escorted plant tours through the Peoria, Illinois factory of Caterpillar Tractor Co. have been reinstated, the company announces. During the last complete year in which such trips were permitted, "Caterpillar" had a total of 19,662 visitors who took advantage of the opportunity to make the tour.

Sier-Bath Introduces New Displacement Pump

The Sier-Bath Gear and Pump Company recently introduced the Gearex Rotary Pump. This pump is of the positive displacement type and comes in internal-bearing models for lubricating fluids and external bearing models for non-lubricating fluids. It is a medium duty pump available in capacities from 1 to 550 gpm. Discharge pressures up to 250 psi. can be maintained with liquids of medium or high viscosity, 50 psi. on low viscosity liquids, such as water and solvents.



Zero-Lash

Registered U. S. Patent Office

HYDRAULIC VALVE ADJUSTERS FOR DIESEL ENGINES

1 **Accurate valve timing and perfect seating at all engine speeds and temperatures.**

2 **Longer life for valves and seats.**

3 **Freedom from tappet adjustment for the life of the engine.**

4 **Silent valve train operation.**

The *Zero-Lash* Hydraulic Valve Adjuster is a simple, positive-action device, which automatically adjusts its own length during each revolution of the camshaft to compensate for expansion or contraction in the valve train. *Zero-Lash* Adjusters are available in three basic types which are adaptable to all internal combustion engines, gasoline or Diesel.

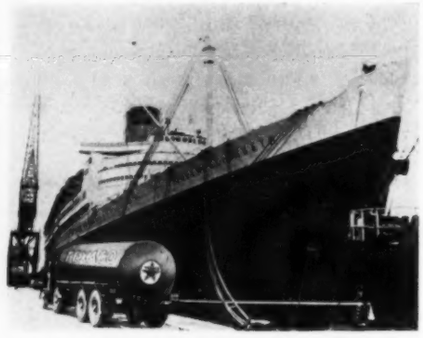
In addition to improved engine performance, longer service life for valve train parts, and silent operation, *Zero-Lash* Hydraulic Valve Adjusters eliminate the need for tappet adjustment, and so permit the simplest and most advantageous engine design. Eaton engineers will be glad to discuss the application of *Zero-Lash* Hydraulic Valve Adjusters to engines now in design.

Illustrated literature covering the design and operation of Zero-Lash Hydraulic Valve Adjusters, including reports of outstanding service records, will be furnished upon request.

EATON

MANUFACTURING COMPANY
WILCOX-RICH DIVISION
9771 French Road · Detroit 13, Michigan

Oiling The *Queen Elizabeth*



A Texaco truck supplies lubricating oil to the "R.M.S. Queen Elizabeth" at her dock at Southampton, England, prior to her maiden voyage as a passenger ship. Texaco Regal Oil "C" has been used exclusively in the main generators of the giant vessel since she left the builder's yard and throughout her war service.

Penn Promotes Cameron To V. P.

D. G. CAMERON, who joined Penn Electric Switch Co., Goshen, Indiana, two years ago as Chief Engineer, was recently elevated to vice president in charge of manufacturing. Cameron's new assignment embraces the manufacturing operations of Penn's Goshen, Canadian and Indianapolis factories. He will coordinate the functions of manufacturing, production, engineering and plant engineering. Succeeding Mr. Cameron as chief engineer is Fred W. Hottenroth, who has been with the company for the past year.

Piston Rings for Two-Cycle Diesels

IN a two-cycle Diesel the oil ring section must control the lube alone as any oil getting past this section passes into the ports. Therefore, special compression rings designed to help out the oil rings are useless in this type of engine, according to Wausau Motor Parts Company engineers.

Conventional pistons for two-cycle Diesels have two oil rings at the extreme bottom of the skirt that must do the entire job. For the top oil groove, Wausau Motor Parts Company has designed a solid double edge scraper type of ring with a step joint that runs a cleaner crankcase. This ring seals the crankcase from the air receiver pressure and prevents dirt from being blown down through the oil ring section to the crankcase. This type of ring when required can be backed up by Swedish steel expanders that will provide a tension of approximately 45 lb. by Link testing methods, which high unit pressure is sometimes required to control the Luboil. Wausau also has available a special alloy metal for Diesel top rings.

Pierce Governor Co. Buys Servo Line from King Seeley

THE Pierce Governor Company has recently purchased the centrifugal governor section of the King Seeley Corporation, according to an announcement by N. M. McCullough, President of the Pierce concern. The purchase includes the production rights, tools and inventory of the Servo line, which will now be produced at Anderson, Indiana under the "Servo" name. Eventually the two lines are to be consolidated and a number of Pierce and Handy-Servo parts will then become interchangeable.

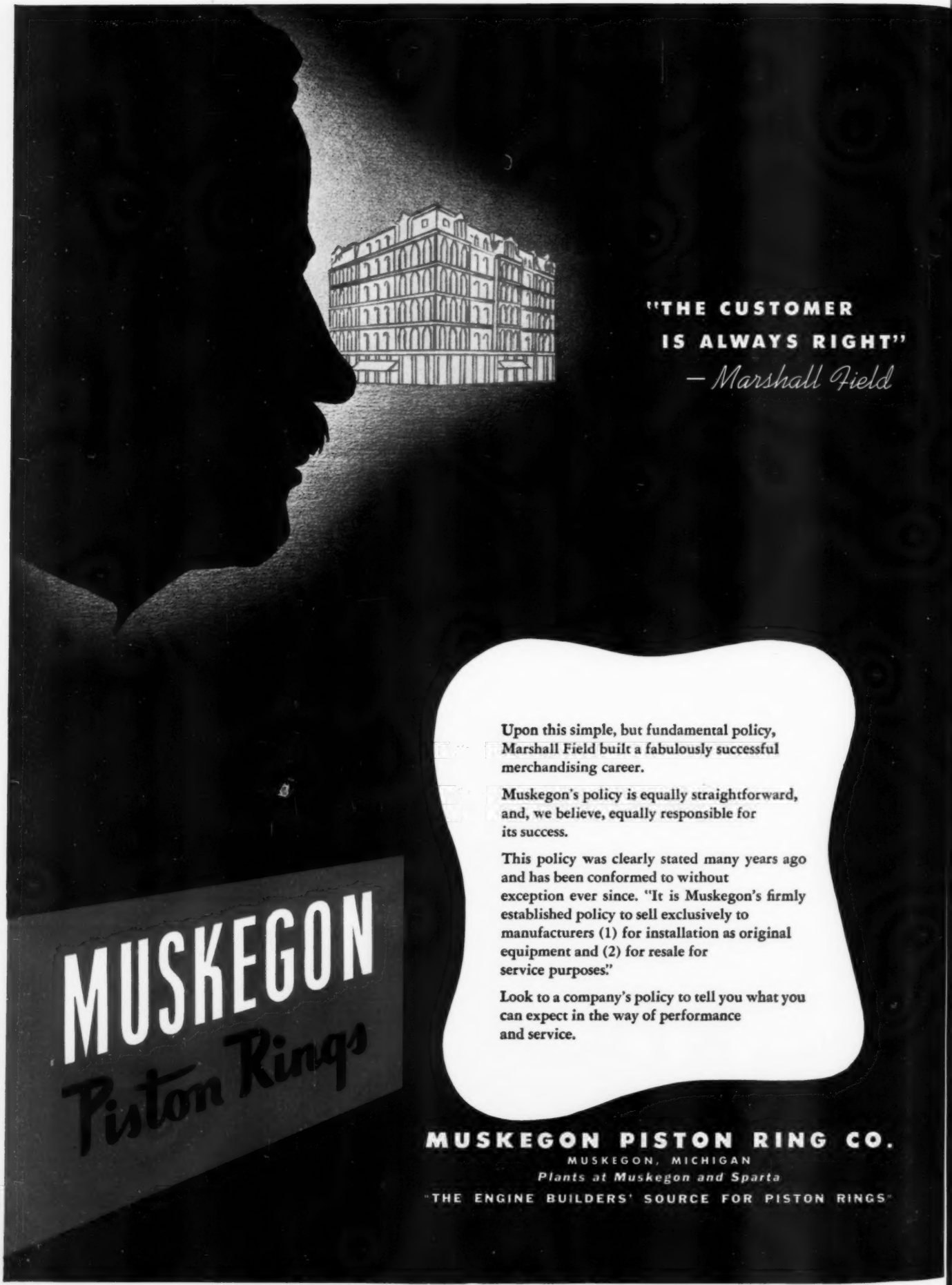
Caterpillar Oilfield Bulletin

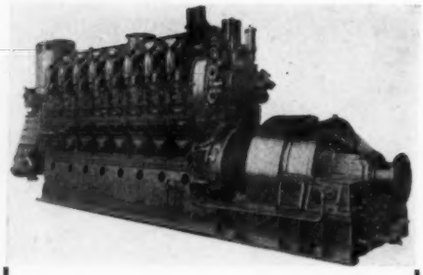
THE many odd jobs that must be done with economy and dispatch in and around the oilfields are portrayed in a new booklet, *The Handy Man of the Oilfields,* published by Caterpillar Tractor Co.

The 8-page color publication, graphically illustrated waives mention of such chores as drilling, transportation, clearing, pipeline construction and pipeline pumping to focus its attention on less publicized tasks performed by "Caterpillar" Diesel products, such as repressuring wells, salt water pond constructions, levelling drilling sites, digging slush pits, road construction and maintenance, oil barge loading and unloading and well servicing.

Copies of the booklet are available by requesting Form 9535 from the Caterpillar Tractor Co., Peoria 8, Illinois.

IF YOU HAVEN'T ORDERED YOUR COPY OF THE 1946 DIESEL ENGINE CATALOG, VOL. 11, BETTER DO IT TODAY, SEE Page 74.


"THE CUSTOMER
IS ALWAYS RIGHT"
— Marshall Field
Upon this simple, but fundamental policy, Marshall Field built a fabulously successful merchandising career.
Muskegon's policy is equally straightforward, and, we believe, equally responsible for its success.
This policy was clearly stated many years ago and has been conformed to without exception ever since. "It is Muskegon's firmly established policy to sell exclusively to manufacturers (1) for installation as original equipment and (2) for resale for service purposes."
Look to a company's policy to tell you what you can expect in the way of performance and service.
MUSKEGON
Piston Rings
MUSKEGON PISTON RING CO.
MUSKEGON, MICHIGAN
Plants at Muskegon and Sparta
"THE ENGINE BUILDERS' SOURCE FOR PISTON RINGS"



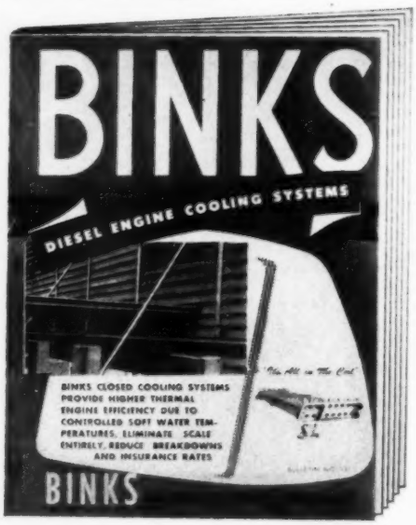
New "Alnor" Bulletin

A new "Alnor" bulletin has just been published by the Illinois Testing Laboratories, Inc. which describes and illustrates the company's complete line of thermocouples for both portable and permanent pyrometer installations. Complete description and illustration of the spare parts and accessories is included. The theory and operation of thermocouples is described fully, amplified by full page charts and tables. The bulletin #4181 is available by writing to the Illinois Testing Laboratories Inc., 420 North La Salle Street, Chicago 10.

Caterpillar Booklet on Refrigeration Plants

Freezing Temperatures Made To Order is the intriguing title of a new eight-page color booklet on refrigeration plants just released by Caterpillar Tractor Co., Peoria 8, Ill. Persons wishing to have a copy of this publication may request Form 9783 from Caterpillar.

Cooling System Booklet Released by Binks Manufacturing Co.



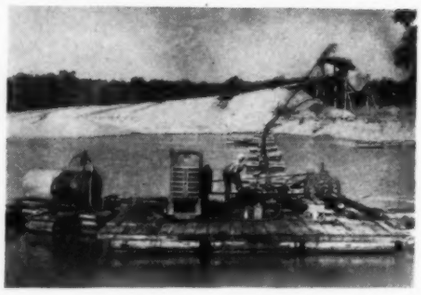
New booklet on Cooling Systems.

A NEW 20-page booklet, titled "Diesel Engine Cooling Systems," has just been released by the Binks Manufacturing Company. This booklet is a valuable addition to the reference library of anyone interested in stationary Diesel engine efficiency and lower operating cost.

Profusely illustrated with pictures, diagrams and blueprints, the booklet will help solve many of the problems encountered every day in Diesel engine cooling. It shows how water jacket scale, overheating, costly break-downs and insurance rates can be greatly reduced or entirely eliminated.

Requests for a free copy should be sent to the Binks Manufacturing Company, 3114-40 Carroll Ave., Chicago 12, Illinois. Ask for Bulletin No. 351.

Raft-Mounted Sand Pumper



Near Fremont, Nebraska, the Paul Christenson Sand and Gravel Co. operates a sand pit in an ingenious manner. Using a raft-mounted power plant which includes a General Motors Diesel driving a six-inch centrifugal pump, sand and water are raised from depths up to fifty feet and forced through 180 feet of six inch pipe to shore. The mixture is then fed to a hopper which traps the sand. The engine has an auxiliary belt drive which powers a winch used to raise or lower the suction pipe.

New Parts Cleaner

A NEW parts cleaner has been developed by the Petroleum Solvents Corporation which is designed to remove all the deposits commonly found on internal combustion engine parts, including Diesel injectors. The new cleaner is of the cold immersion type, requiring no heat. It is harmless to all metals, to the hands and to clothing.

The Siloo Parts Cleaner, as the product is called, is a single phase product, which means that all of it is cleaning material. It has the same evaporation characteristic as water and thus needs no sealing layer of non-cleaning liquid. It is miscible with Stoddard's Solvent Mineral Spirits, kerosene, Diesel fuel, and similar materials. It is non-inflammable.

Parts to be cleaned are immersed in a pan of the cleaner from 10 to 30 minutes. Best results are obtained by agitating the parts to be cleaned. For hard carbon deposits a longer period of soaking is required. For a final rinse the cleaner is very efficient leaving a mild rust preventative film.

Write the Petroleum Solvents Corporation, 331 Madison Ave., New York 17, N. Y., for further information.

Liquid Fuels Insured for 1,000 Years by U. S. Coal Reserves

Although liquid and gaseous fuels make up only 1.2% of the mineral-fuel reserve of the United States, the reserves of coal and lignite can be used to supplement declining reserves of natural gas and petroleum for "certainly not less than 1,000 and probably for 2,000 years," according to Arno C. Fieldner, Chief of the fuels and explosives branch of the Bureau of Mines. Speaking before the annual meeting of the ASME recently, Mr. Fieldner went on to say, "These solid fuels can be converted to gaseous and liquid fuel. It is quite reasonable, therefore, to assume that these fuels will be available at least for a thousand years and for a much longer period if atomic energy can be harnessed economically for the generation of heat and power. Developments in the efficient use of fuels should go far to offset the cost of conversion of solid fuels to liquids and gases."

Theodore H. Venn

THEODORE H. VENN, 66, one of the founders of the Venn-Severin Machine Company, died recently after suffering a heart attack. Mr. Venn, whose association with the Venn Severin Machine Company dated back to 1906, is survived by two daughters and a son, Charles. His address at the time of his death was 121 Maple Avenue, Wilmette, Illinois.

Young Radiators On Portable Power Plants

IN the November issue of DIESEL PROGRESS in the article entitled *Portable Power Plants For Rehabilitation of War Torn Areas* which described some of the largest portable power plants built in this country, we neglected to specifically name the manufacturer who supplied the cooling radiators for these large units. These remarkable cooling radiators were supplied by the Young Radiator Company, whose expert engineering on this job made external cooling water sources unnecessary for operation.

Gulf Promotes Goddard

HOMER A. GODDARD, lubrication engineer, has been appointed assistant division manager in charge of industrial lubricating sales for the Pittsburgh Division of Gulf Oil Corporation, embracing Western Pennsylvania and West Virginia. He succeeds S. A. Newman, who has been advanced to the position of chief turbine lubrication engineer in the general office. Mr. Goddard is a resident of Pittsburgh, where he will continue to make his headquarters.

Muskegon Piston Ring Appoints A. Verne Jackson

A. Verne Jackson has joined the Muskegon Piston Ring Company as a sales representative in its Detroit office in the New Center Building. Mr. Jackson has had broad experience in automotive and industrial engine design. For thirteen years he was a Project Engineer in the central office of the Chevrolet Motor Company. Prior to that he was Chief Engineer of Hinkley Motors, Inc. and a Sales Engineer in the Marine and Automotive Division of the Buda Company. He is a member of the Engineering Society of Detroit, the Society of Automotive Engineers and the American Society for Metals.

New Cleveland Hileo Representative

THE Hilliard Corporation of Elmira, New York, announced recently the appointment of S. L. Powers, 606 Williamson Building, Cleveland, Ohio, as their new representative in this area. Mr. Powers has had considerable experience in engineering, lubricating, and fuel oil purification, and maintenance equipment, and is a member of the A.S.L.E.

Air Compressor Service Manual

A NEW 146 page manual for servicing air compressors has been published by the Quincy Compressor Co. for use by industrial jobbers and their service men. This new manual combining service data and parts lists is believed to be the only one of its type in the compressor industry. The manual starts with data showing detail drawings of various types of installations. This is followed with maintenance and trouble-shooting charts and "what to do about it" information all clearly illustrated.

This manual is available without charge to industrial jobbers who handle the Quincy line and who maintain an Authorized Quincy Service Department. Write the Quincy Compressor Co. Quincy, Illinois.

New Battery Charging System Announced by Leece-Neville Co.

THE Leece-Neville Co. recently announced the development of a new electrical generating system for gasoline or Diesel engines designed to produce more electric power with reduced weight and at the same time promote long battery life. Designed for six or twelve volt circuits, the generator is suitable for installation on automotive type Diesels in buses and trucks. The weight of a typical bus-type alternator generator is 45 lbs. compared to the conventional generator's 169 lbs. For further details write the Leece-Neville Co., 5353 Hamilton Ave. N.E., Cleveland, Ohio.

IF YOU HAVEN'T ORDERED YOUR COPY OF THE 1946 DIESEL ENGINE CATALOG, VOL. 11, BETTER DO IT TODAY, SEE Page 75.

Ranson Represents Electric Machinery Co. in Carolina

Russell Ranson

ELECTRIC Machinery Mfg. Company has appointed Russell Ranson as sales representative for North Carolina and South Carolina.

Following his graduation in electrical engineering from Duke University in 1931, Mr. Ranson was with General Electric Company three years. Then he spent five years as a member of Duke University's electrical department staff, and worked a time for the Duke Power Company. The last seven years Mr. Ranson has been with the Clark Controller Company at Cleveland, first as development engineer and later in charge of research and development, during which time he was a director of that company.

In addition to Electric Machinery Mfg. Company, Mr. Ranson represents Weston Electrical Instrument Corporation.

R. E. POST

R. E. POST, veteran representative of Fairbanks, Morse & Co., who has for the past decade been manager of the firm's Washington, D. C. office, passed away after a month's illness on November 13.

Bob, as he was well known by his host of friends in Army, Navy and civilian circles, had a long and illustrious career with the E. and T. Fairbanks and Company, joining Fairbanks, Morse & Co., when the two organizations were merged. Mr. Post was born January 4, 1877 in Wilmington, N. C. He was educated in the public schools and high school of Wilmington and the Stevens Preparatory School and Stevens Institute of Technology.

WEST COAST DIESEL NEWS

By FRED M. BURT

C. TODD HECKER has been appointed as Sales Manager for the seven California stores of Ets-Hokin & Galvan, electricians so prominent in control and other marine installations connected with Diesel engines on fishing and other boats.

MASTER Builders, Alameda, will build a 102 ft. combination tuna and sardine purse seiner for Vince Cardinalli, San Francisco boat owner and fisherman; with all-brine refrigeration, she will be powered with a 550 hp. Union Diesel engine.

THE *Rose Marie* 30 ft. Albacore boat owned by Paul Helmick of Solromar, Ventura County, is powered by a 25 hp. Caterpillar Diesel bought from Shepherd Diesel Marine of Los Angeles.

POWERED with a 110 hp. General Motors 4 cyl. Diesel sold by Dallas Cook, Eureka, Calif., a new 44 ft. troller was recently completed at Fort Bragg by Frank Hyman, Sr., for Vernon Hager, Crescent City.

THE *I Done It* is a new 62 ft. fishing vessel built at Fellows & Stewart yard, Terminal Island by Jack Wiedonroth alone in 270 days. She is powered with a Caterpillar 115 hp., 6 cyl. Diesel; auxiliary is a 4-7 hp. Witte, distributing power by line shaft.

CHARLIE CHAPLIN'S Stephens cruiser *Panacea*, completely overhauled and modernized at Harbor Boat & Yacht Co., San Diego, has been re-powered with two new 225 hp. Gray-marine Diesels; 20 knots will be the new speed.

PORTLAND Tug and Barge Co. with coastwise towing rights (from the I.C.C.) has purchased seven Mikimiki type tugs from Maritime Commission surplus stocks. Four are powered by twin 690 hp. Fairbanks-Morse Diesel engines, the other three by twin 600 hp. Diesels of the same make.

RECONVERTED to former status as fishing boats, after return by the government, by Western Boat Bldg. Co., Tacoma, are the *St. Francis*, 93 ft. tuna boat with 400 hp. Enterprise Diesel; the *Phoebe* with a 400 hp. Atlas Diesel; and the *Western Fisher*, 96 ft. seiner with another 400 hp. Atlas Diesel for propulsion.

A NEW 85 ft. purser seiner type vessel for South Pacific Fisheries, Ltd., Honolulu, built by Grandy Boat Co., Seattle; Coolidge, Hart & Brinck designers; for main engine has a 8 cyl., 265 hp. Hendy Diesel engine; auxiliary power is from two Caterpillar Diesels.

TO make a demonstration for the Chilean government, the trawler *Arauco II* traveled 6,000 miles from Vancouver, B. C., to Valparaiso. The 60 ft. vessel is powered with a 120 hp. Vivian Diesel. Built from Douglas fir, she was designed and built by Will Vivian, Vancouver, and his associate, J. H. Budd.

HIELERA del Mayosa, an ice company owned by David Sugich and Ignacio Ruiz, in Navajoa, Sonora, Mexico, has just installed two 120 hp., 2 cyl., 360 rpm. Fairbanks-Morse Diesel engines, one direct connected to a York 7 ft. x 7 ft. ammonia ice compressor, the other V-belted to a single 25 kva. Onan generator for lights and auxiliary power.

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